

THE IRON AGE

PRODUCTION -- MANAGEMENT

APRIL 26, 1934

PROCESSES -- NEWS



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THE IRON AGE

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APRIL 26, 1934

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Has Steel Passed Its Technological Savings to the Public?

THE price policy in the steel industry has again been brought into the field of political consideration. The present paper relates to one aspect of this subject: Have the steel companies over the years reduced their prices in proportion to the savings in costs of production made possible by technological improvements?

The writer has read with interest recent statements on both sides of this question. Admittedly, the issue does not permit of exact evaluation, but, if steel prices have shown a downward trend while prices in almost all other important industries have shown a rising trend, there is a strong presumption that savings in costs have been passed on satisfactorily. Such has indeed been the fact. One of the outstanding features of commodity price history since the beginning of the present century is the downward trend of steel prices up to the begin-

By J. L. SNYDER

Associate Professor of Business Statistics
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ning of the Great War while the prices of commodities in general were advancing approximately 3 per cent per year. Moreover, after the war and post-war boom period the downward trend of steel prices was resumed, whereas the trend of prices in general was practically a horizontal one up to the beginning of the great depression.

These contrasting trends are shown by the two curves on the first accompanying chart. The curve for steel prices plots the composite price of finished steel items, compiled by THE IRON AGE, and represents between 85 and 90 per cent of total steel tonnage.

The curve for prices in general is the "All Commodities" index of the U. S. Bureau of Labor Statistics, which in the later years includes approximately 800 items taken from all of the important industries and commodity markets.

Similar, though less pronounced, contrasts in trend are also shown by the two curves on the second chart, in which finished steel prices are compared with the curve based upon the B. L. S. group index for metals and metal products (including other industries in addition to steel). Thus, the steel industry has shown a more marked downward trend of prices than other industries in the metals group.

The point that is here being made may be substantiated further by a comparison of the trend of steel prices with the trends shown by the other curves on the chart. These curves represent all of the groups of com-

IN its recent report to the Senate, the Federal Trade Commission criticized an editorial in The Iron Age which revealed the fact that iron and steel prices had suffered more than their share of deflation as compared with other commodity groups and with respect to the long term pre-war level. Part of the commission's criticisms were

factually answered in "Common Sense Applied to Price Levels," which appeared a week later in The Iron Age of March 29.

Following this thought a step further, Professor Snyder takes up the commission's question as to whether steel has passed on to the public a "full and fair share" of the

fruits of its technological progress. In this article he contrasts the long term price trends of finished steel with the price trends of other commodity groups and with the general commodity average. As a result of this study, he arrives at "a strong presumption that savings in cost of steel have been passed on satisfactorily."

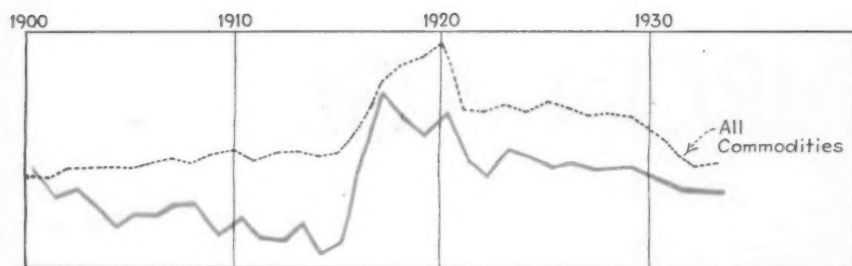


Chart 1. Finished steel composite price trend compared with trend of general commodity prices.

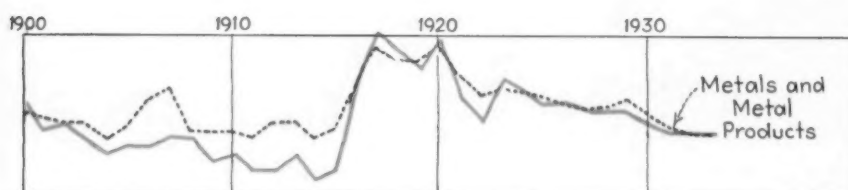


Chart 2. Finished steel composite price trend compared with price trend of metals and metal products group.

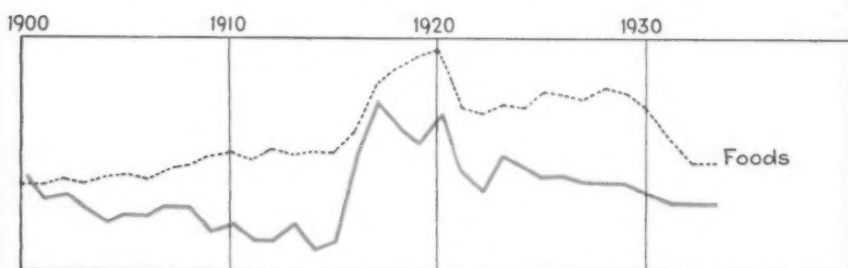


Chart 4. Finished steel composite price trend compared with price trend of food products.

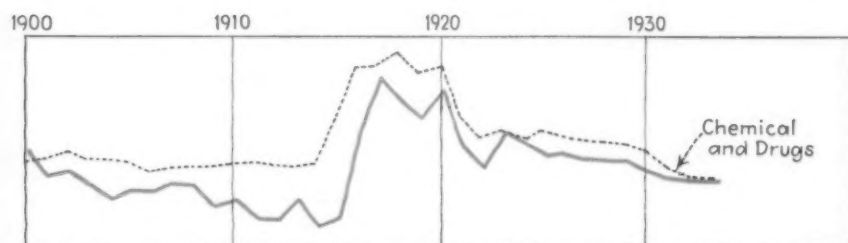


Chart 9. Finished steel composite price trend compared with price trend of chemicals and drugs group.

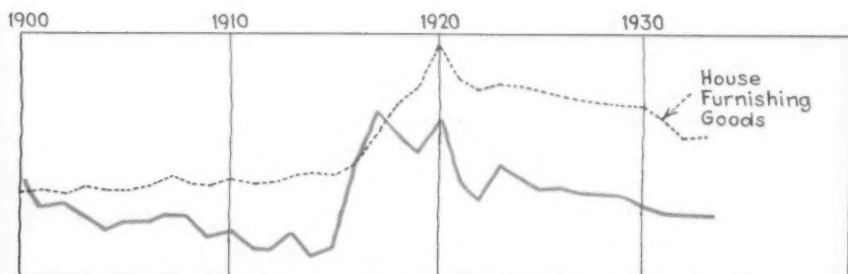


Chart 10. Finished steel composite price trend compared with price trend of house furnishing goods.

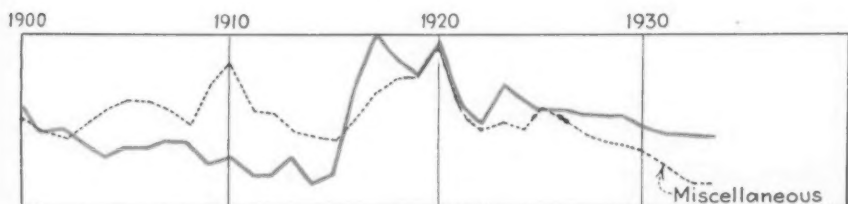


Chart 11. Finished steel composite price trend compared with price trend of miscellaneous commodity group.

Comparison of Trend of Prices With Trends Commodity

(The curve for steel prices is the composite price of finished steel, constructed from data from *The Iron Age*. The other curves are constructed from the index numbers for groups of related commodities and for "All Commodities," as compiled by the U. S. Bureau of Labor Statistics. Annual averages of monthly data

commodities which constitute the B. L. S. "All Commodities" index. The contrast between steel prices (or the metals and metal products group) and the prices of farm products (the fourth chart) is particularly striking. The upward trend in the prices of farm products was even sharper than the upward trend in the general price average ("All Commodities") during the pre-war period. Moreover, with the war episode eliminated, the pre-war rate of increase appears to have been closely approximated almost up to the beginning of the depression in 1929.

Fluctuations in prices of foods (see the fourth chart) have been very similar to those in farm products and, consequently, there is again a marked contrast between the upward trend of food prices and the downward trend of steel prices.

Prices in the leather industry (the fifth chart) exhibited an especially sharp upward trend before the war, with a horizontal or slightly upward trend after it.

Prices of building materials and house furnishing goods not only had an upward trend before the war but held during the post-war period of prosperity at exceptionally high levels relative to their own pre-war levels.

Of the various groups covered by the B. L. S. data, chemicals and miscellaneous are the ones whose trends have most closely resembled the trend of steel prices. The trend of the miscellaneous group was not so seriously broken by the war as were the trends of the other groups. Among the commodities included in this group are rubber, automobile tires and tubes, paper and pulp, tobacco products, and cattle feed.

Finished Steel Composite of Prices of Various Groups

are plotted and the curves are drawn to the same logarithmic scale.

To facilitate the comparison of relative trends, the finished steel price curve is superimposed in each instance upon the commodity group curve with which it is compared, the point of coincidence being 1900.)

As implied at the outset, a comparison of price trends cannot settle the issue as to whether or not prices have been reduced over the years in full proportion to lowered costs of production, but in a case such as the present one, where the trend of steel prices has been downward over a long period while the general price trend has been upward or horizontal and the trends of important groups of commodities have been sharply upward, the burden of proof must be on those who maintain that decreases in costs have not been passed on satisfactorily in the form of lower prices.

Since the present analysis is concerned with the *trend* of prices, a discussion of the cyclical decline during the present depression is somewhat beyond its scope. A brief consideration should perhaps be given, however. Steel prices did not fall as much during 1930-32 as the general average of prices. Among the various groups, farm products suffered the most. The unfortunate aspect of price fluctuations during the depression has been that the general average of prices and the prices of farm products and other important groups have declined so drastically, not that steel prices have failed to go down as much as others. In other words, much the more constructive development would be for the prices of those groups, which have suffered drastically, to rise substantially than for the prices of steel to fall further. Fortunately, the efforts of the Administration have, in general, been based upon such an interpretation. As a matter of fact, during the past 12 to 14 months of advancing prices the general average of prices, and farm products in particular, have risen much more than steel prices.

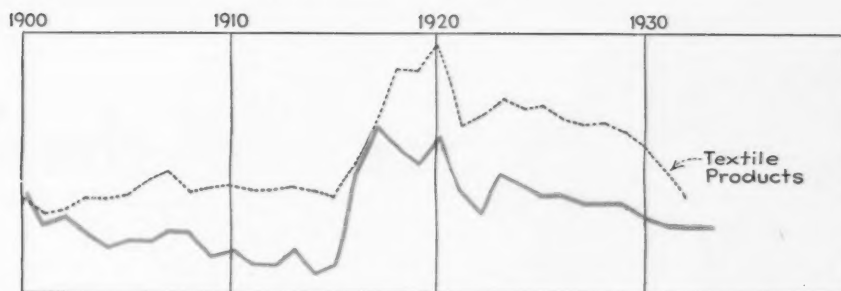


Chart 6. Finished steel composite price trend compared with price trend of textile products.

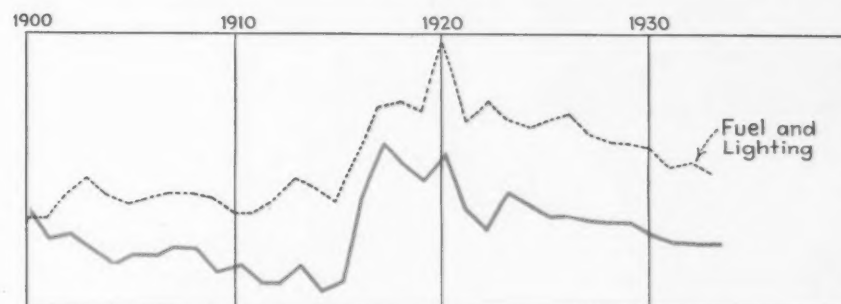


Chart 7. Finished steel composite price trend compared with price trend of fuels and lighting group.

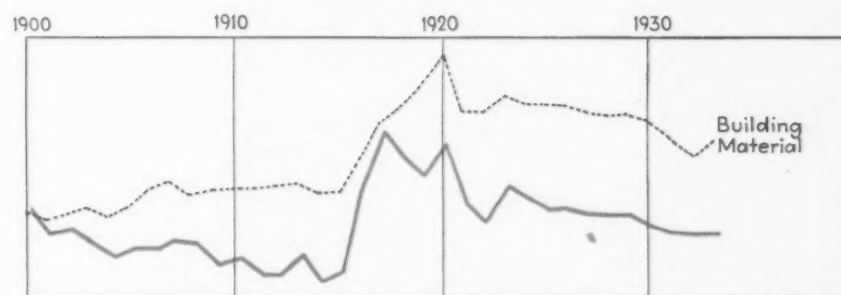


Chart 8. Finished steel composite price trend compared with price trend of building materials group.

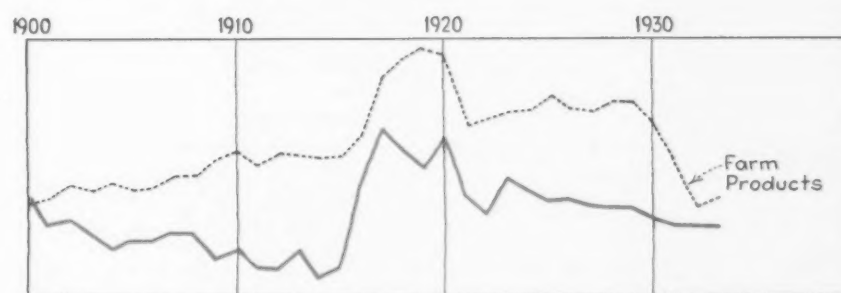


Chart 3. Finished steel composite price trend compared with price trend of farm products.

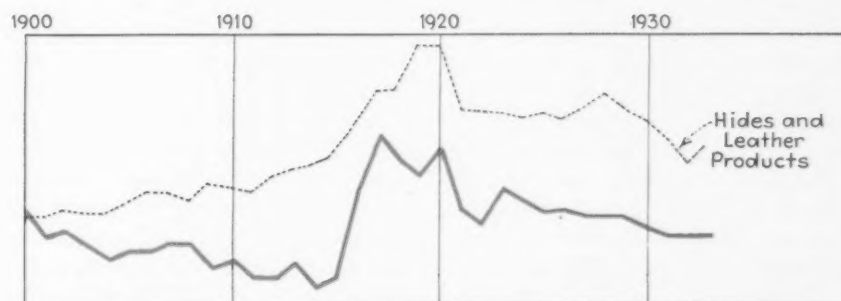


Chart 5. Finished steel composite price trend compared with price trend of hides and leather products group.



Status of the Young Engin

WHAT is taking place in the changing industrial and social aspects of life is profoundly affecting the status of the engineer. Such is the theme of an address delivered before the Land Grant College Association in Chicago by E. B. Roberts, of the Westinghouse Electric & Mfg. Co. Here are some of his views:

Fewer Engineers Will Be Needed

"We have passed in our national history from a period of exploitation, speculation, and development into a level period of operation in which fewer engineers will be needed.

"Superior ability and training will be demanded for success, not only in the field of engineering operations which will demand the services of the greater number, but especially on the part of the relatively smaller group that will continue to push engineering research and design into yet unexplored fields. As the temporary strain of numbers is relieved, quality must receive the emphasis.

Will Retire at 60 Years

"Quick adaptability to productive work will be rewarded. No longer dare the graduate be advised to drift about for five or more years. These are years no longer available for experiment. His big stake, if he is to win one, must come before age forty. Productive life will end earlier than in the past: sixty may see him retired.

"Under the new conditions post-graduate training will flourish, but much of it will be in industry and as a part of the job, but with the cooperation of the schools. Curiously, this graduate education will not all be vocational or professional, but it will exhibit aspects of broad culture

seeking to develop independence of personality, and creative thought—looking toward a worthwhile life after retirement. Curiously, too, industry will foster and develop this side of post-school training along with the vocational.

Promise Lies in Perceiving New Uses of Products

"Finally, and more immediately important, engineering teachers must recognize new fields for these graduates. Hitherto, the very immensity of the rich fields of research and design, that lay so near at hand, has caused adjacent acres to lie uncultivated and neglected. That the graduates themselves are pioneering the way is already apparent in the occupational shift to commerce and distribution. It must be significant that the few recent graduates who have found technical work are not in research and design, but in manufacturing and selling. Let faculties and students reflect that there are other engineering functions besides the creation of material things and dealing in the abstract features of science.

"For years industry has offered the thesis that ability to perceive a possibility of a new application for an engineering product and the negotiation of its use—calls for as high an order of ability and training as does the design and manufacture of the products in the first place. But it has been met with the retort, 'He is too good a man to be wasted on sales.' This must pass away, and the function of negotiation, arbitration, and interpretation placed with design, research, and process as broad fields of endeavor for engineers of the future. It is only through the recognition of

this outlet for engineering training, and the preparation of programs of teaching for it with the same conspicuous care and judgment that was put on building men for the technical fields, that the engineers of the future will be saved. But, if done, as it may be, perhaps through time society itself may be saved."

A Scarcity of Youth

In leading up to the foregoing statements, which he offered as his conclusions, Mr. Roberts touched on the slowing up of the country's population growth but also on what may be termed the age characteristic of the population. On this he said:

"In 1850, youth was abundant, and age was scarce. Now this is reversed, and youth is scarce and maturity, abundant. While the instantaneous view reveals many young men unemployed, nevertheless it is, true that scarcity makes for a premium, and plenty for a discount. The relative number of youths in the population has been halved since 1850, and in another twenty years, will be halved again. This is an example of the transient condition of oversupply, tending to obscure an inevitable reverse condition. It is decidedly a factor on the bright side, so far as the placement of graduates is concerned."

He next considered the increase in industrial activity between 1920 and 1930 with the concurrent mechanization of everything in the home, on the farm and in the mill, as well as in commerce, and emphasized how some engineers, more versatile than others, had to apply themselves to seeking new outlets for their products. "It is the action of the versatile group," he said, "that will bear close

eer in the Years Ahead



FRESH emphasis on the need of the engineer's carving out his own career rather than depending on others to conceive projects requiring his skill; statistical evidence that the young man is in a potentially strong position; the likelihood that the expansion period for colleges has come to an end—these are some of the highlights in a thought-provoking address here reported at length.

examination. It is a collective effort to sustain the pace that had been set. It is apparent that a distinct shift has occurred, not alone of engineers, but of all the population, from the farm, the mine and the mill—the real sources of production—to the more social functions of commerce, transportation, business, domestic service, and the liberal professions; 1930 claimed 73 more persons out of every thousand for the promotional aspects of life than did 1920, and all of these 73 were drawn from the productive group, for the miscellaneous small groups, such as those engaged in government service, remained the same. Engineering alone gained 10, represented largely by the vast increase in planning, supervision, designing, promotion, selling, etc. 1930 to 1933 has seen cessation of all promotion and retrenchment in the other fields. The acceleration, or rate of change, of 1920-1930 cannot be sustained.

Leaders Will Come from College-Trained Group

"But there is another factor on the positive side. In business not over

one-half of the better positions are held by college graduates. Inevitably a larger proportion of these jobs must be commanded by college men. The country cannot expect to recruit as large a proportion of its leaders by promotion from the ranks of those without a formal education as it could a generation ago, for the reason that there is not now in the ranks the relative number of young men of inherent ability that there was a generation or more ago. Those who have that ability to become leaders have found a way to go to school, and they go to make up a large proportion of that increase in high school and college population which we now have, in spite of the fact that the proportion of youth to the whole population is falling rapidly. It is simply inevitable that leaders in the future must be drawn from the college-trained group.

Expansion of Colleges a Thing of the Past

"We must be guarded not to fall into the conclusion that schools will continue to turn out increasingly larger classes. Such is not the case. Education, because of its momentum, cannot respond to changes so readily as can industry. They must keep on turning out their product, even in the absence of demand for it. College enrollments this year are equal to or slightly above those of last. Ultimately, however, the enrollment trend is down, even though the transient complications cloud the fact. Already there are vacant seats in the first and second grade rooms of our rural and urban schools. Neither public schools nor colleges will have the continuing problem of expanding faculties,

building facilities, libraries, and laboratories.

"So far as engineering enrollment is concerned, the trend is turning down, even in advance of the general decline. There is a shift from engineering to the business courses and other departments reported by a number of the most significant schools. The reason has been construed in several ways. President Shantz of the University of Arizona joins with President Hutchins of Chicago in interpreting this to be a keen interest on the part of the rising generation to know more about the world in which it lives, and to adjust itself to the conditions of the New Deal. I would look for the reason in the interpretation youth puts on current events. A lawyer, a dentist, a physician, or even a business man can be out of a job without apparently being so. He still has an office, a routine, and some perfunctory activities which give him the appearance of still being on the job. The engineer, on the other hand, under our modern conditions, if out of a job, is an unemployed man. He has no paraphernalia for continuing in the appearances of being at work. We can say that fifty thousand engineers are unemployed with some certainty, but no one can tell how many lawyers and how many doctors are, at the same time, out of work. Whether the deeper or the more superficial reason accounts for the lead engineering is taking in the decline, it is assuredly a fact that the engineers of the country are not as nearly fully employed as are those in the professions."

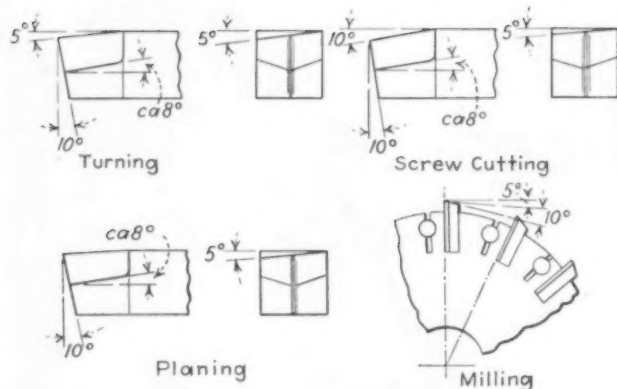


FIG. 1. Angle sizes of cemented carbide tools for various machining operations on glass.

Machining Glass

AS far as machining technique is concerned, glass is entirely different from metals. This difference is not due to the entirely different properties of glass in the finished condition, nor due to the entirely different production methods, but is primarily due to the difficulties encountered in the forming and working of glass into usable objects.

Glass workers take all the forming difficulties into consideration, and carry out forming operations at temperatures at which glass can be worked. Because of the great softening interval, glass is even more workable than metal at high temperatures, but at room temperatures it is inferior to metal as far as finishing and polishing are concerned because of its brittle nature. From the standpoint of hardness, brittleness, and tensile strength¹ at room temperature, the satisfactory machining of glass has been apparently hopeless until a very recent period.

There are, of course, several common methods of cutting and polishing glass, but they are far from satisfactory. The possibility of cutting glass rests upon the fact² that if once the extraordinary hard surface is penetrated, the transference of a break into the interior takes place comparatively easily, and at times this fracture transference takes place to an undesirable degree. The polishing of glass, however, is a delicate mechanical operation, and, in contradistinction to cutting, it consists of wearing down the hard surface piecemeal without altering the internal cohesion. The polishing treatment has considerable economic disadvantage inasmuch as the operation is slow and requires a great amount of polishing material.

The circumstances above have, however, been entirely changed by the use of sintered hard metal carbide alloys, the origination and structure

of which were detailed in previous articles. Moreover, sintered carbide tools are being used in the finishing of hard insulator materials such as fibre, glazed cardboard, mica, porcelain, and materials such as Micalex, a compressed inorganic insulating material which consists mainly of mica and glass. The sintered alloys work glass just as satisfactorily,³ and it is now possible, after many years of preliminary researches and experiments, to turn, mill, plane, and drill glass objects economically and satisfactorily. The exactness in dimensions obtained approach the tolerances required in the production of machine

parts from metallic materials, and it is now possible to cut glass threads with an exactness entirely sufficient for all usual purposes.

In the working of glass with carbide alloys the shaping is not done by means of a detachment of cuttings,⁴ because there is no formation of chips due to the brittleness of the material. The tool hooks back of the smallest inequalities of the surface during its first contact and thereby pulls out the smallest particles which again leave behind freshly fractured surfaces. The operation thereby always renewedly provides the tool with new surfaces for attack.

Cooling Is Necessary

Adequate cooling of a workpiece during machining operations is of absolute importance. There is a strong development of heat during the working procedure, and because of the poor heat conductivity of the glass the creation of cracks would be unavoidable unless sufficient cooling be provided. In general the machines used for metal working can be adapted to the working of glass, but it is necessary that they be in perfect condition. The effects of even small oscillations are more unsatisfactory and disadvantageous in glass machining with respect to the quality of the surface than in the case of metallic substances. In addition, the dressing of the working tools requires special care.

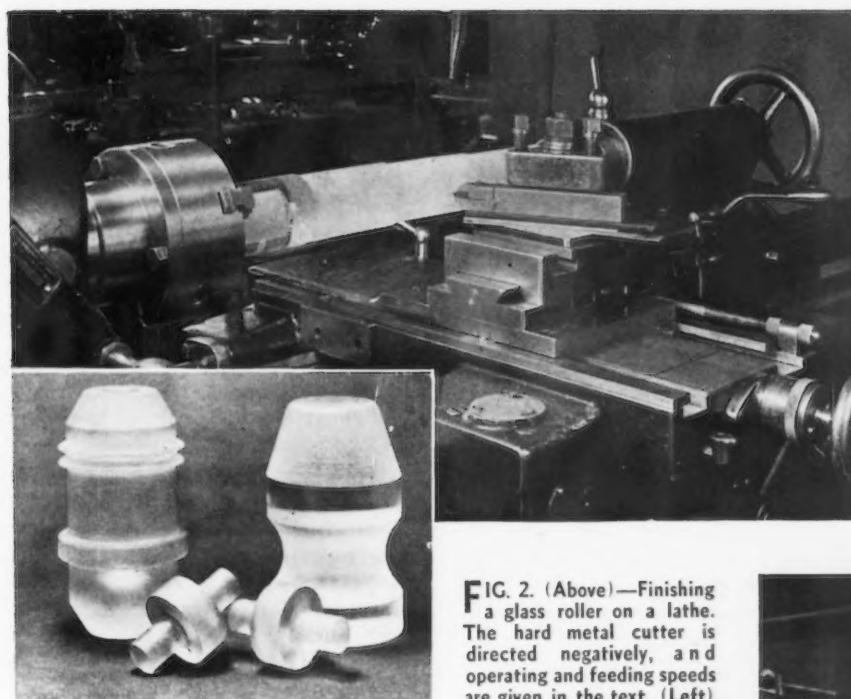
Experience has shown that hard metal tools for the working of glass require a different grinding than is customary for the working of metal. A compilation of the angle sizes to which the tools intended for the different kinds of glass machining should be ground is illustrated in Fig. 1.

The first finishing operation to be considered is turning. In this operation it is possible to operate the glass at a peripheral speed of about 260 ft.

IN this, the third and last article of the series dealing with cemented tungsten carbides (the preceding articles appeared in THE IRON AGE, issues of Feb. 1 and Feb. 22), the authors present a most comprehensive review of tested shop practices in the machining of glass. As glass is probably the most difficult of materials to successfully turn and mill, the procedures described herein should be partially transferable to the cutting and finishing of extremely hard and brittle metallic and non-metallic materials. The superiority of sintered tools for cutting hard materials at high speeds probably arises from their abnormally high capacity for superhardening. Hard chips passing the edge under very heavy pressure harden the top surface of the tool and increase its resistance to subsequent abrasion, and it is, therefore, often advisable to work hard materials with carbide tools before the tools are used on soft steels and non-ferrous alloys.

with Sintered Carbide Tools ▲ ▲ ▲

By KARL SCHROETER and A. FEHSE



per min., and depth of cut of about 0.12 in. Feeding should always be done by hand. Naturally for finishing the cutting depth must be much less than 0.12 in.

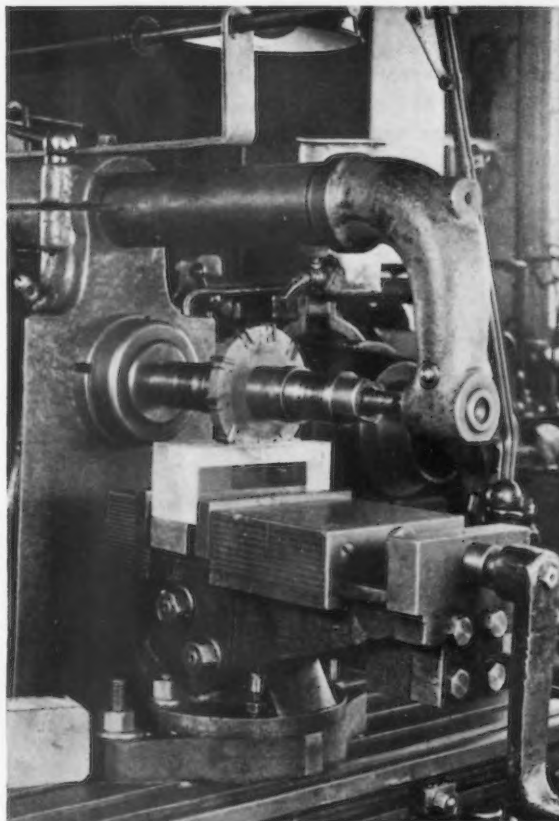
In Fig. 2 there is shown a glass roller being finished on a lathe. The hard metal cutter is exchangeable, and, in this case, it is directed negatively. During rough finishing the cutting speed was $v = 260$ to 325 ft. per min., with a feed of $S = 0.004$ in., and depth of chip $a = 0.08$ to 0.12 in. During finishing, however, the same cutting speed was used, but a feed of $S = 0.0008$ in. and a depth of chip of $a = 0.004$ in. were used.

Several pieces of glass shaped in this manner are shown in the lower left of Fig. 2. The forms were turned out of cylindrical glass bodies. The two small rollers with turned pins at both sides, which are seen in the fore-

FIG. 2. (Above)—Finishing a glass roller on a lathe. The hard metal cutter is directed negatively, and operating and feeding speeds are given in the text. (Left)—These forms and stoppers were turned on a lathe. The stoppers in the foreground fit exactly into the bores of the forms, although the dry seals are not entirely airtight.



FIG. 3. Glass can be milled or slotted as shown at right. The work piece is cut from both edges toward the middle to forestall chipping at the edges.



ground of the illustration, fit exactly into the bores at the ends of the forms turned into the shape of a cone shown in the background. Moreover, the seal is so exact that pressing in or pulling out of the pins do not require a very large force. This type of fit facilitates the exit or entrance of inclosed air during insertion and pulling out of the rollers.

Characteristics of the Glass

It is of considerable importance to consider the requirements demanded of the glass which is to be machined. It is possible to finish hard almost as well as soft glass. The authors are particularly familiar with glasses having coefficients of expansion of

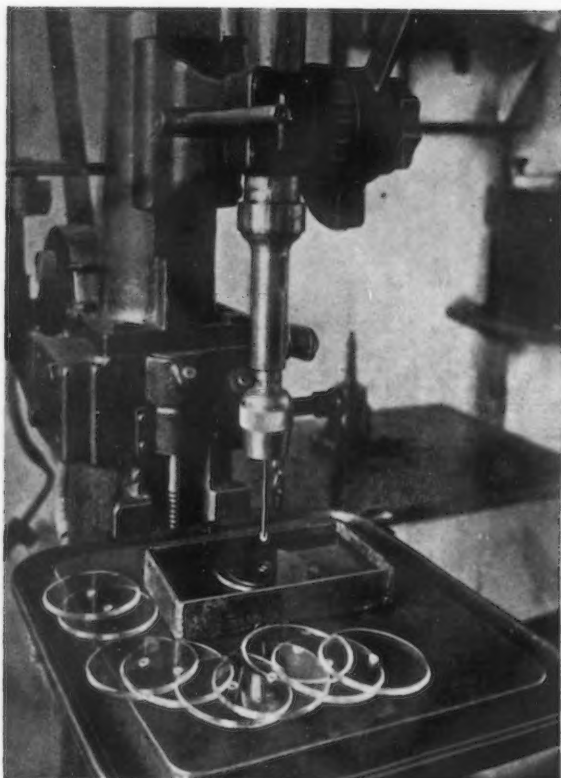


FIG. 6. Glass acid nozzle with interior and exterior threads cut with sintered carbide tools at right. The threads are greased to give an air-tight seal.



FIG. 4. Drilling glass switch plates at left. About 160 plates can be pierced for each drill sharpening, and more than 300 plates can be drilled in one hour.

39 x 10⁵ to 100 x 10⁵. Throughout this whole range the same methods of machining were applicable. Of course the hardness of the glass has some influence on the finishing, and if a surface is to closely resemble matte silk the glass should not be too hard. That is to say, glasses with coefficients of expansion between 80 x 10⁵ and 90 x 10⁵ are best suited for the production of even the finest surfaces, but if the glasses are softer the tool has a tendency to tear out large particles from the surface.

A peculiar and at first confusing observation might well be mentioned here. If on an ordinary lathe as is customarily used in the experiments, a thick rough plane chip from an ordinary glass is taken there is then obtained a very coarse surface. If this operation is repeated with a hard glass the surface is considerably better. It would, however, be dangerous to conclude that hard glasses are better suited for turning than the softer glasses. The case is entirely altered if the surface is finished by polishing. With ordinary glass the surfaces secured are entirely satisfactory whereas the hard glass behaves in an extraordinarily refractory manner. Whereas the finest surface chips can be removed by the tool, the subsequent surface is less fine than the original.

An ordinary shop lathe can in a certain sense be considered as overloaded during the machining of glass with hard metal tools. The magnitude of the oscillations which appear indi-

cates the heavy forces encountered, and the appearance of the surface after finishing is directly dependent on the tendency of the lathe to vibrate. Of course, the tendency is even more pronounced in the case of very hard glasses. There are times when the oscillating jerks of the tool exceed the chips' thickness, and then no further turning is able to improve the surface. In the case of hard glass this condition is reached more quickly than in the turning of soft glass. This condition is especially pronounced in the case of poor lathes, but the phenomenon appears to some extent in even the best type of equipment. From the above observations it is possible therefore to determine the type of glass and quality of lathe required for any particular glass surface desired. In addition, it is imperative that the glass be kept well cooled during working in order to minimize the possibility of fracturing.

Milling Procedure

It is possible to mill or slot glass by machine as shown in Fig. 3. A disk miller tipped with hard metal cutters is preferably used as a tool. For this work a preliminary machining is recommended. That is, the surface should be cleared with a radius or angle miller, and then it should be milled gradually in from the edges. The workpiece seen in Fig. 3 was milled with a cutting speed of $v = 162$ ft. per min., a feed of $S = 0.0036$ in., and a depth of chip $a = 0.4$ in. Dur-

ing milling and turning it is imperative to work from the edges to the middle in order to avoid a bursting out at the edges of the cut. It is also comparatively simple to plane simple forms. Operating values are about $v = 60$ strokes per min. cutting speed, feed $S = 0.004$ in., and depth of chip $a = 0.004$ in.

Drilling of glass, as in the case of metal, can be performed on a lathe or on a drilling machine. In drilling on the lathe the cutting speed is 50 to 65 ft. per min., and the feed is preferably carried out by hand. A large number of glass pieces have been drilled and the comparative efficiencies are well established. For drilling massive pieces of glass, spiral drills with hard metal cutters of 0.06 to 0.6 in. diameter are preferable. With such drills 320 holes 0.32 in. in diameter can be perfectly drilled in Thuringia glass in one hour. A regrinding of the drills is necessary after about each 140 pieces.

Spoon bits, just like the special drills with flexible shaft for drilling through thinner glass pieces, have proved quite satisfactory. The latter, however, require a certain amount of care while in operation in order to avoid drill damage at the cutters by jerky working conditions, etc. Recent experiences seem to prove that it is advantageous to use pointed drills during drilling.

A representation of the practical application of drilling with a hard metal drill is shown in Fig. 4. Glass switch plates 0.20 to 0.22 in. thick were drilled open with a cutting speed of 55 ft. per min. and hand feed at a hole depth of 0.12 in. Under these conditions 2000 glass plates were drilled open in 6½ hr. The drilling procedure took place in a vessel under water, and the drill was resharpened 12 times so that 160 plates could be drilled open with each resharpening of the drill. About 300 plates could be pierced in one hour by this method. It is, therefore, apparent that drilling with hard metal has considerable potential factory application.

In Fig. 5 there is shown a glass cylinder being finished which was pierced with a special drill provided with a water feed. In this case a preliminary drilling with a drill of 0.32

in. diameter at 425 r.p.m. was employed, and then the hole was finished with a drill of 0.88 in. diameter at 225 r.p.m. In both cases the feed was by hand. The water flow through the drill shaft, as shown in the sketch, must be in sufficient volume to wash the separated glass particles out of the drill hole.

If glass objects are to be constructed in several pieces, the glasses must have very similar coefficients of expansion in case the completed article is subjected to thermal changes. A compilation of nearly all described glass working methods is contained in the model of a calendar for acid pastes made entirely of glass shown in THE IRON AGE of Feb. 1. The cylinders with turned bearing pins are worked out of a glass block, and the attaching of the side cheeks is by means of metal screws which engage cut-in glass threads.

An additional example of cutting of threads in glass by means of hard metal tools is recognized in Fig. 6. The object is an acid nozzle with interior and exterior screw threads of sufficient length to give a good seal against liquids when light grease is used.

The illustrations shown herein represent only a few examples of shaped pieces which can be obtained from glass by employing hard metal tools.

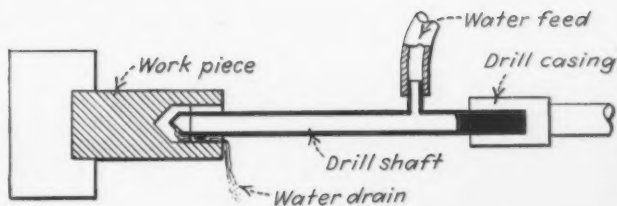


FIG. 5. Piercing a glass cylinder with a special drill provided with a water feed. The flow of water prevents a temperature rise and also washes out the separated glass particles. The arrangement of the hollow drill is sketched at the upper left.

It is extremely probable that numerous other application possibilities will appear for particular purposes.

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Thermit Welding Quickly Restores Street Car Service

WITH the breaking of the main drive shaft at a power house of the Market Street Railway Co., San Francisco, three car lines were completely tied up. As obtaining and installing a new shaft would probably have required several weeks, with the car lines still out of service, it was decided to repair the shaft by the Thermit welding process.

The shaft which fractured is 18½ ft. long and has a large drive gear in the center and a cable drum at each end and one each side of the drive gear. The break was at a shoulder of the drive gear seat and bearing, the diameters of the shaft at this point being 10½ and 13½ in. With the shaft in place, and requiring the minimum of dismantling, the repair was made in less than 36 hours.

The break occurred on a Saturday at 3.30 p. m. At 5 p. m. preparation for the welding was under way, a

(Concluded on Page 63)



How Attractive Finish Helps

16—Polishing Different Metals

THE value of specific surface characteristics of metal products after polishing is often overlooked not only by the shop superintendent but by sales managers and top executives as well. Obviously a definite effect in the appearance of a product should be sought, otherwise finishing becomes a matter of chance, and processes cannot be standardized or costs determined.

If it were possible to draw a curve showing the sales appeal of different finishes, and plot with this a curve of costs, the two curves would probably increase together and yet there could be no fixed relationship between them. A very high gloss, for instance, only achieves value when associated with appropriate products. For some metal articles an elaborate and expensive finish might prove an economy in the long run, yet for others a less expensive finish might have a greater sales value.

Costs of finishing vary through a wide range. A small metal product may perhaps be polished for 10c., but a different kind of luster or of color effect on the same product may cost 20c. or even 30c. to produce.

A manufacturer of building hardware, when questioned about polishing, said: "Our trouble is not how to do a particular job of polishing and buffing but, rather, to determine what kind of a final finish we should have. Take our chromium door sets. Do we want a mirror finish which looks fancy when first unwrapped but shows finger marks, or would it be better for us to use a dull finish which keeps its appearance longer? No one can tell you about such things. You've just got to try different finishes and see how they sell, and the strange thing is that sometimes a finish which is a big number in the East won't

go at all out through the Middle West."

Comparing Polished Surfaces

With any type of finish, definite specification is difficult, as shown by the fact that several engineering societies' committees have been working for years in an attempt to describe and standardize some of the more common finishes as, for instance, the finish of a gray iron casting as it comes from the mold.

In polishing, it is particularly dif-

WHAT kind of finish on metal products has the greatest sales appeal? This is a question which has been appearing again and again in this series. It is a question which if solved for any one product or any one metal must be solved again for another product and another metal. This article deals with problems concerning the polishing of some of the more usual industrial metals, including stainless steel, brass, aluminum and nickel.

fiult to accurately describe a finish. Usually one polished surface is differentiated from another by the natures of the abrasive grain last used on each. Metal, for instance, may be polished or buffed until all marks left after No. 150 abrasive grain have been removed. A description of this sort can be only approximate because the method of removing the fine grain scratches determines the effect of the coloring. However, if a sales manager determines for any one product by trial and error, as suggested by

the manufacturer quoted above, the finish which has the greatest sales value, then it is fairly simple for the head of his polishing department to duplicate this finish in quantity production, provided the material from which the product is made runs uniform.

Polishing Different Products

Among the thousands of articles on which polishing is considered one of the regular manufacturing operations are the following items which give some idea of the diversity in this field: Stoves, wrenches, tools, hardware, auto trim, cutlery, oil burners, shovels, axes, sewing machines, typewriters, bath room fixtures, sad irons, plumbing supplies, bicycles, guns, cooking utensils.

Frequently it is desirable for a manufacturer to change the metal used for a certain product, and under such circumstances he may want to keep as close as possible to the original finish. A thimble manufacturer changed from German silver to aluminum and desired to keep the appearance of the new thimble the same as that of the old. This was a special problem which finally was solved to the satisfaction of the manufacturer through a combination of acid dipping and buffing with a sequence of different compounds.

A certain type of finish often becomes associated with a product and thus develops a value independent of its actual appearance. For example: a manufacturer of a special kind of edged tool changed from carbon steel to an alloy steel of improved properties, but in so doing, he changed the final appearance and received complaints from old customers. In this case it was merely necessary to alter a few details in polishing to adjust for the change in material and

Metal Products Sales ▲ ▲ ▲

By HERBERT R. SIMONDS

to maintain the original appearance. Because of the different behavior of different metals under the polishing wheel, it seems advisable to consider the polishing characteristics of some of the more common materials.

Polishing Brass

A brass surface has characteristics for the polisher similar to steel. However, because it is softer, some of the operations required for a high luster on steel are frequently omitted in the case of brass. Small brass castings such as pipe fittings are frequently water tumbled, then polished on large wheels using a compound of grease and No. 150 emery. For a better finish this is followed by buffing with tripoli and coloring with rouge.

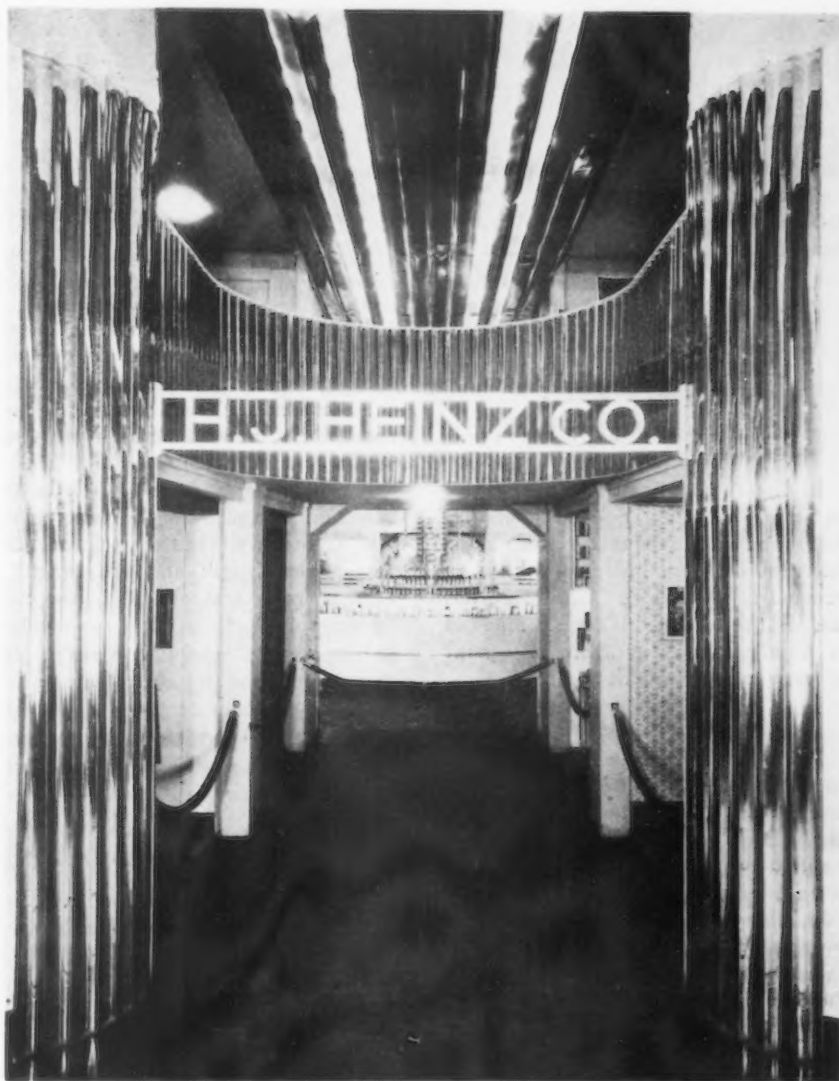
As with most metals, the final finish on brass is determined by the early polishing operations and even where castings are fine grained, the above method will not remove all of the sand marks. A more careful polishing calls for the use of a series of different abrasive grain sizes in successive operations. Some foundries sand blast, then rough polish brass castings with No. 80 emery, and follow this with a wheel set up with No. 120, and finally buff with a grease and fine emery compound.

Die marks may be removed from sheet brass products by much the same technique as above, although some special compounds have been developed for this particular service. The Lea Mfg. Co., Waterbury, Conn., gives the following practice for finishing stamped lighting fixtures made of brass: (1) the parts after they come from the dies are polished on 10 in. sewed pieced buffs at 2400 r.p.m., using Grade C compound, (2) they are then oxidized in liquid sulphur solution, and (3) finally they

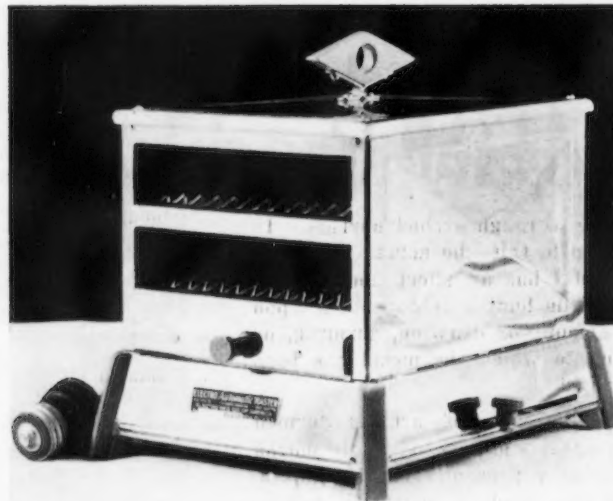
are relieved on 8 in. loose buffs at 1800 r.p.m., using Grade A compound.

For nickel plating of brass the Magnus Chemical Co., Garwood, N. J.,

recommends using a high grade tripoli compound which is free from unsaponifiable grease, then following this with thorough washing, rinsing,



THE effective use of high polished chrome plated copper is shown at this exhibit entrance. The corrugated portion in the foreground is 16 oz. sheeting, plated and polished at the American Nickeloid Co. plant.



▲ ▲ ▲ THIS is a typical example where high polish means increased sales appeal.

(Upper) The use of polished nickel steel sheets in making this corn popper lifts it at once into a quality class.

(Lower) Stamped metal trays are successfully made by the Mathews Mfg. Co., Detroit, Mich., from sheets which are plated and polished before blanking. ▲ ▲ ▲

and drying, and then buffing with a high-grade lime compound. After buffing, the parts should be promptly cleaned in the following sequence:

- 1 Immerse in electro cleaning tank
- 2 Rinse in cold water
- 3 Dip in cyanide
- 4 Rinse in cold water
- 5 Dip in acid
- 6 Rinse in cold water
- 7 Nickel plate
- 8 Rinse in cold water
- 9 Rinse in hot water

In electro cleaning the work should be the cathode. Special cleaning compounds are frequently used after different coloring operations and, as previously mentioned in this series, the nature of the buffing compound is highly important from the point of view of subsequent cleaning.

Polishing Nickel

A chromium finish is almost always encountered as a plate over other metals or other plated coatings. A chromium plate, particularly when applied over a nickel plate, calls for careful cleaning because the chromium film, being extremely thin, often not over 0.00002 in., must be preserved intact when it is desired to get the full appearance value. In a chromium plate over nickel the nickel must be given a very high polish. One large manufacturer, polishing with wheels set up with No. 120 abrasive, uses the following sequence to prepare nickel for chromium plating: Grease

coloring with fine emery cake, cutting down with tripoli, then coloring with white finish and cleaning with whitening.

Monel Metal

The procedure in polishing Monel metal is similar to that for nickel, although many Monel metal products call for a matte finish which does not require so many buffing operations. When cold rolled Monel metal sheets are polished for cabinet work in hotels and restaurants, the operations are frequently reduced to two, the first using tripoli and the second a chrome oxide compound. In the case of stampings, it is often economical to remove die marks with emery before using the tripoli. One manufacturer of sinks removes die marks around the corners locally by means of a small portable emery-coated buff.

Another manufacturer of deep drawn Monel metal products uses the following sequence:

1. No. 120 emery dry.
2. No. 150 emery and grease.
3. No. 180 emery and grease.
4. Tripoli.
5. Fine lime.
6. Clean with whitening.

Occasionally the above sequence is modified by introducing a polishing operation with a sheepskin wheel set up with No. 200 emery, and many

manufacturers use artificial abrasives in place of emery.

Polishing Zinc

Zinc is sensitive to alkaline corrosion and calls for special cleaners. For rolled zinc which is to be plated, one company recommends buffing with free-cutting tripoli and then coloring on a soft buff traveling at 6000 ft. per min. using a soft dry white compound, then electro cleaning in a boiling cleaning solution with the work as a cathode, followed by a hot and a cold rinse and an acid dip in one per cent hydrochloric acid, then a cold rinse and finally the nickel plate process. Interior trimmings for automobiles are frequently made of zinc alloys which are polished on large soft wheels set up with No. 120 abrasive. This is followed with tripoli and then with pumice and water on a tampico wheel, when the parts are ready to be cleaned for plating. After nickel plating, these parts are frequently brushed over with pumice and water on wire wheels.

Polishing Stainless Steel

In the specialized field of polishing stainless steel, R. S. Leather of the Lea Mfg. Co. gives the following conclusions based on the experience of his company and to some extent on the use of its compounds:

"As with any other material, the

various taken in the app raw ma mill. It burnishe jected causing addition the meta ing. Th the amo rolling t subjected

"In th from she are usua A sever always c the poin known a quires c and buffi of the an

"On t grain siz sive, typ is, wheth the speed sure of t all must to give l

A few plant op indicate g tails mus each indi

Examples

A. Table sired. sheet

1. No. polis
2. No. whee
3. No. poun
4. Buff
5. Tripo
6. Rou

B. Reame diamet

1. No. 1
2. No. 1
3. No. 1
4. Buffi
5. Buffi

C. Forged ish des

1. No. 1
2. No. 1
3. No. 1
4. Tripo
5. Pum

D. Forged color c

1. No. 1
2. No. 1
3. No. 1

various mechanical features must be taken into account. These include the appearance of the surface of the raw material as it comes from the mill. It may have been polished or burnished, or it may have been subjected to a severe pickling operation causing a rough etched surface. In addition to this, the actual temper of the metal has an effect upon polishing. This temper is dependent upon the amount of drawing, forming, or rolling to which the metal has been subjected.

"In the case of articles formed from sheet stainless steel, die marks are usually present, even if minute. A severe bending operation nearly always causes a slight roughening at the point of the bend. This effect, known as the orange peel effect, requires considerably more polishing and buffing than the unbent portion of the article.

"On the polishing operation the grain size, type and blending of abrasive, type of polishing wheels—that is, whether hard, medium, or soft—the speed of the wheels and the pressure of the wheels against the work, all must be considered and adjusted to give best results."

A few cases taken from actual plant operations are here offered to indicate general practice, although details must be altered to adjust to each individual set of conditions.

Examples of Stainless Steel Polishing

A. Table cutlery. Mirror finish desired. Products blanked out of sheet stainless steel.

1. No. 90 artificial abrasive on set-up polishing wheel.
2. No. 120 dry abrasive on buffing wheel.
3. No. 180 abrasive and grease compound on soft buffing wheel.
4. Buff using flour abrasive compound.
5. Tripoli or special compound for cutting down.
6. Rouge for coloring.

B. Reamed stampings about 8 in. in diameter. High coloring desired.

1. No. 120 dry set-up wheel.
2. No. 120 set-up wheel with grease.
3. No. 180 set-up wheel with grease.
4. Buffing with cutting compound.
5. Buffing with coloring compound.

C. Forged golf club heads. Satin finish desired.

1. No. 120 abrasive and grease.
2. No. 150 abrasive dry.
3. No. 180 abrasive with grease.
4. Tripoli.
5. Pumice on tampico wheel.

D. Forged golf club heads. High color desired.

1. No. 120 abrasive dry.
2. No. 120 abrasive and grease compound.
3. No. 150 abrasive dry.



Courtesy, American Nickeloid Co.

THE use of polished metal for interior trim is increasing in popularity. This corner of one of the New York offices of the Johns-Manville Corp. shows polished metal molding strips used between the panels and also at the point where the walls meet the ceiling. The curtain trim is also of polished metal.

4. No. 180 abrasive and grease compound.
5. Cutting down compound.
6. Rouge buffing.

Use of Special Compounds

"Polishing operations on stainless steel with the abrasive firmly glued to the surface of the polishing wheel," continues Mr. Leather's statement, "are often too severe to give greatest efficiency. The grains which are tightly held to the surface of the polishing wheel cause harsh cutting or gouging, and the cuts must be removed in the subsequent polishing or buffing operations. Grease is used on some polishing wheels to reduce this harshness, but it is still a relatively severe operation whenever abrasive grains are held rigid while they are doing the cutting.

"To relieve this harsh action the Lea Mfg. Co. developed a series of special compounds which contain fine but sharp abrasive grains mixed with a binder containing no grease but having the property of adhering to a soft buff as the compound dries. This leaves a very thin layer of dry abrasive attached to the flexible sur-

face of the buffing wheel. The function of the use of such a combination is intermediate between the usual polishing and buffing operations and in many cases it is found that one or more polishing operations may be thereby eliminated. The surface, after using the greaseless compound, is easier to buff than where work goes direct from a polishing wheel to the regular buffing operation."

Greaseless Buffing

The following example in the use of a greaseless compound is taken from the experience of a table cutlery manufacturer. The products are stainless steel forgings. The former method of polishing was

1. No. 90 dry set-up wheel.
2. No. 150 dry set-up wheel.
3. Cutting burrs off lines with loose buffs set up to a hard face with No. 180 grain.

The new method uses

1. No. 90 dry set-up wheel.
2. No. 150 dry set-up wheel.
3. Lea compound Grade E on 4 in. loose buff operated at 3300 r.p.m.

The use of the greaseless compound
(Concluded on Page 70)

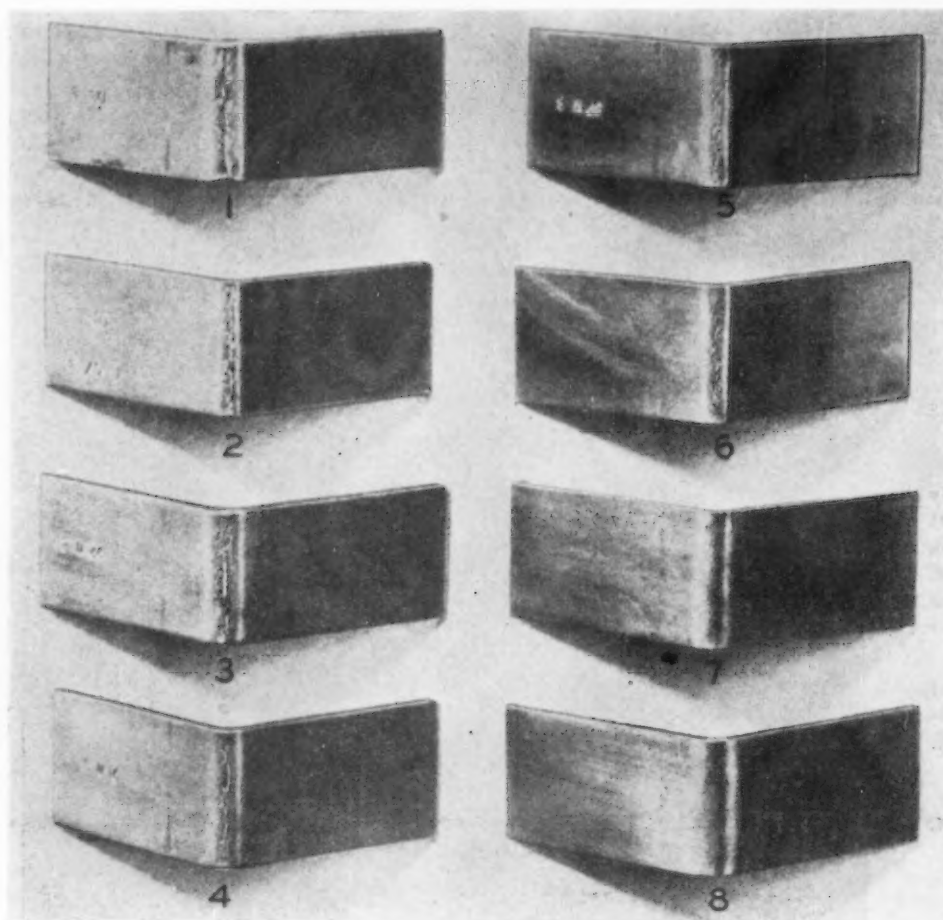


Fig. 1—Effects of 90-deg. bends of various radii on brass sheet. As the radius of the right-angle bends is made larger, the outer surface cracking becomes less pronounced and the "orange peel" effect becomes finer grained. With a large enough radius no effect is noticeable, and in this series of bends the sample marked 7 is considered satisfactory.

IN designing formed metal parts, space and weight limitations demand the use of sections which are both small in size and light in weight, but which possess sufficient strength to insure the proper functioning of the product. In general these requirements are best met by the use of parts made from formed sheet metal, either with punches and dies, by roll forming, or on multi-slide presses. Parts made in this manner are not only lighter than castings, or machined or forged parts, but have the additional advantage of being identical and interchangeable, which are essential requirements if mass production is to be achieved at a reasonable cost to the ultimate consumer.

There has been very little work done on the bending characteristics of various metals with the result that designers are often unable to definitely specify the best or most economical formed part for a particular product. Therefore there is considerable value to any investigation which defines the optimum or the minimum bending

¹ A.I.M.E., Inst. of Metals Division for 1931, pp. 317-328.

radius of various metals. A few years ago there was described¹ tests for determining satisfactory forming radii for sheet metals of various kinds and thicknesses. The test specimens which were used were sheared from sheets in three different directions, parallel, perpendicular, and at 45 deg. to the direction of rolling. The forming was done in a press, and six accurately ground 90 deg. V-shaped forming punches were used: One of the punches was ground sharp, and the others ground with radii of 0.0156, 0.0312, 0.0625, 0.0937, and 0.125 in. The die had an accurately ground sharp 90-deg. groove.

After forming, the specimens were visually examined and classified according to the condition of the outside surface at the bend. Results ranged from complete fractures to bends having smooth surfaces with no apparent effect as shown in Fig. 1. A numerical relationship between the thickness of the sheets and the radius of the tool that formed acceptable bends was not attempted in view of the effect of variation in grain size, temper, and composition of the materials. Never-

Bending

theless, the actual data on particular sheets were applied to an advantage in the forming of certain types of telephone parts, thereby demonstrating the practicability of using additional data throughout the metal working industry.

It is expected that the data which are collected may serve some useful purpose in estimating the relative bendability of different thicknesses and tempers of the commonly used alloys included in this study. At all times, allowances must be made in any specific use of the data for commercial variations in the metal or in the fabricating process.

The punch press method of determining the minimum satisfactory bending radii is somewhat unsatisfactory due

to the equipment and preparation involved, so this description deals with a slightly modified and considerably extended method for determining radii for use in all design work involving sheet metal. The Amsler bend-test machine described herein does not involve a personal element such as visual inspection of the bend, but unlike the basic punch press method it *does not* give directly the minimum satisfactory radius of a bend. However, by correlating the results obtained from the two types of tests it has been possible to employ the Amsler test to determine minimum radii directly.

In the Amsler testing machine, shown in Fig. 2, the specimens are repeatedly bent through an arc of approximately 90 deg. until failure occurs. The bending is done over mandrels of accurately ground radii, and by bending several specimens of the same material over mandrels of three different radii and recording the number of bends before failure of each, a plot may be made as shown in Fig. 3. Such plots have not as yet been made for all thicknesses, but for the

Properties of Sheet Metal

24 B. & S. gage material shown it has been found that the radius of a bend corresponding to five bends before failure on the Amsler machine plus a small constant gave a satisfactory radius as determined by the punch press forming test. When this relationship is established for all thicknesses, it will be possible to use the Amsler testing machine, which involves no personal element, to determine the minimum satisfactory forming radii for all materials.

Thus, from the preceding discussion it can be seen that two tests are available for determining the forming properties of sheet metals. The basic test is, of course, the one which employs the 90 deg. V-shaped mandrel, since the arbitrary constants necessary for use in applying the Amsler reversed-bend test are determined from the former test. Once these con-

METALLURGICAL literature yields very little regarding the bending characteristics of various sheet metals, so machine and tool designers have been forced to depend on past experience and rule-of-thumb methods of guidance regarding the optimum shape of metallic parts. Several years ago one study was made concerning the minimum tool radius for acceptable bends, and the investigation discussed herein is an ex-

tension of that study. Whereas the original method employed a basic test using 90 deg. V-shaped mandrels, in this procedure there is used a more simple commercial dynamic forming test which is within the experimental scope of smaller manufacturers. These data are an abstract of an article by G. R. Gohn in the Bell Laboratories Record and an earlier investigation by W. A. Straw, M. D. Helfrick, and C. R. Fischrupp.

stants are determined, however, any new material may be tested by means of the Amsler test, which is the preferable one since it is free from any personal or observational error.

A variety of ferrous and non-ferrous sheet metals have already been tested, including the widely used types of brass, phosphor bronze, and nickel silver. Usually thicknesses have run

from 0.005 to $\frac{1}{8}$ in., although heavier material has been tested. Since maximum strength is usually required for metal parts, the harder tempers are generally employed, and it is desirable that this test be used in order that the smallest radius of bend be employed as can be satisfactorily made. Such bending investigations reduce the possibility of weakened parts due to too sharp bends.

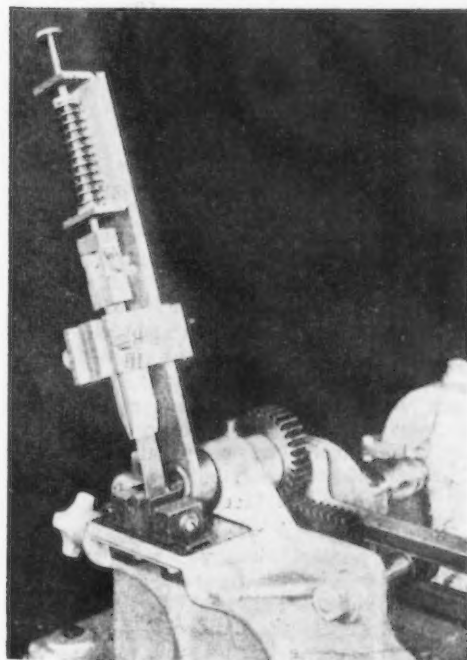


Fig. 2—The Amsler testing machine repeatedly bends sheet metal samples at right angles over mandrels of different radii until the samples break. This test can be used to determine the minimum satisfactory bending radius for any gage or kind of metal.

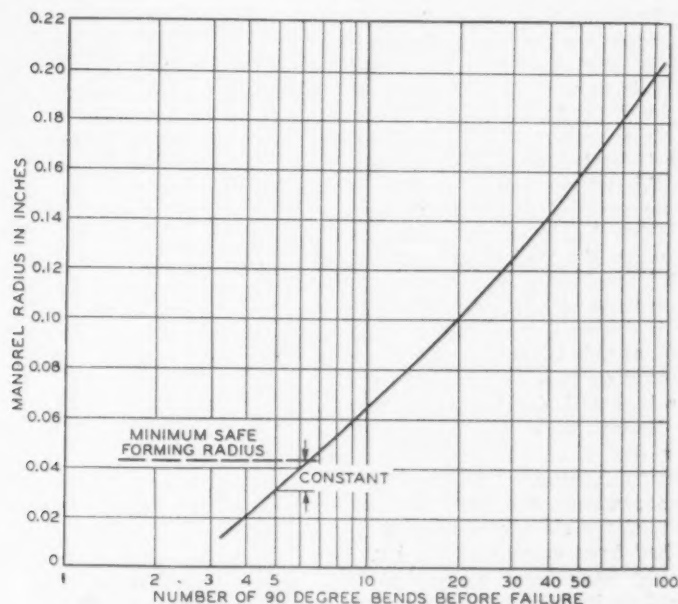


Fig. 3—Radius of bend plotted against number of bends before failure, from results obtained with an Amsler testing machine using 24 B.&S. gage material. This type of testing is preferred to the punch press method as it is free from any personal or observational error.

Hardness Variations as Controlled

THE old color method of tempering has stood the test of years, and, although it has its limitations, if intelligently applied it will result in a fairly accurate control of hardness. Of course the bath method is superior in many respects, but the time required for heating and the expense involved usually make it economically prohibitive for most small shops. There has been little serious investigation as to the limits and reliability of a color drawback, and this study was undertaken to definitely disprove the method or to establish certain fundamentals which would be of use in actual shop operations. The results are considered satisfactory in many respects.

It will be shown that the time element is automatically controlled when tempering to color and this is of considerable importance as it is generally ignored in the average tool room where bath tempering is used. When tempering a large tool a failure to consider the time element often causes it to be too hard and too brittle.

This is illustrated in the case of a buckle die made of water hardening steel containing 1 per cent carbon and of a size about 4 in. x 4 in. x 5 in. This particular die was properly quenched with a stream of water against its face. The tempering was carried out in a nitrate bath by heating to 450 deg. F. and holding the bath at this temperature for 30 min. The Rockwell hardness of the die after this treatment was C 64. Steel of this analysis if heated to 450 deg. F. and held at this temperature for 30 min. should Rockwell C 62. The explanation is that the die was not at 450 deg. F. when the timing was started. A decided toughening of 1 per cent C water hardening steel occurs when the temper is drawn from C 64 to C 62 Rockwell, as this is the range wherein the retained gamma iron is converted to alpha iron with decided toughening effect. Hence, in a case like this, unless a die of this size is held at temperature for quite some time, high hardness readings are apt to occur. However, if the color method of tempering had been employed, the hardness could have been controlled to C 61 or C 62 by slowly drawing on a plate to a light straw color.

It is not difficult to control and check errors when a hardness tester is available, but, unfortunately, the

average small plant has insufficient equipment to detect mistakes, and the color method is, therefore, for them often more reliable than bath tempering.

There are a number of conditions which affect the appearance of temper colors, and in order to temper to the best advantage these variables must be understood and taken into consideration.

Tool makers and treaters often ask whether drawing to the same color quickly or slowly causes any variation in the resulting hardness. In order to investigate this question a number of samples of steel were heated both quickly and slowly to various maximum temperatures under conditions where both the temperature and the time were accurately controlled. The experimental results are shown in the temper color scale in Table I.

Accurate Control Obtained

To produce this scale 180 pieces of 0.95 carbon steel were used. Each of these pieces was $\frac{1}{4}$ x $\frac{1}{2}$ x 0.022 in. in size, and they were heated to 1400 deg. F., quenched in water, smoothly ground, and tempered in the following way:

A hole $\frac{5}{16}$ in. in diameter was drilled to a depth of 2 in. in the center of the face of a block of machine steel which was $4\frac{1}{2}$ in. x $4\frac{1}{2}$ in. size. The bulb of an accurate thermometer was inserted into this hole, and the intervening space was filled with an alloy melting at 300 deg. F. This alloy in the molten state was also flooded to a depth of $\frac{1}{8}$ in. over the entire top face of the block, and tests showed that when the temperature of the block was held constant there was very close uniformity of temperature between the thermometer bulb and any part of the block surface.

This block was heated by placing it on a steel plate which in turn was heated by a burner of the type used in a kitchen range. By soldering 6 in. of wire to the handle of the stop cock of the gas burner and rotating this wire over a graduated and carefully calibrated scale it was found possible to hold the block to within plus or minus one degree of any desired temperature within the range used in the experiment.

All that was required to draw the

TABLE NO. I

Color	Temperature and Time*	Rockwell Hardness
Very light Straw	425 deg. F.—5 min.	C 63.5
	450 deg. F.—3 min.	C 63.5
	475 deg. F.—1 min.	C 62.5
	500 deg. F.—30 sec.	C 62.6
	525 deg. F.—10 sec.	C 63.1
Light Straw	550 deg. F.—5 sec.	C 62.4
	425 deg. F.—10 min.	C 63.2
	450 deg. F.—5 min.	C 62.9
	475 deg. F.—3 min.	C 61.8
	500 deg. F.—1 min.	C 62.2
Full Straw	525 deg. F.—20 sec.	C 62.4
	550 deg. F.—10 sec.	C 61.6
	575 deg. F.—5 sec.	C 62.8
	425 deg. F.—20 sec.	C 63.0
	450 deg. F.—10 min.	C 62.3
Dark Straw	475 deg. F.—5 min.	C 61.4
	500 deg. F.—2 min.	C 61.5
	525 deg. F.—1 min.	C 61.4
	550 deg. F.—20 sec.	C 61.2
	575 deg. F.—8 sec.	C 62.2
Very Dark Straw	450 deg. F.—20 min.	C 59.9
	475 deg. F.—8 min.	C 61.1
	500 deg. F.—3 min.	C 61.1
	525 deg. F.—1½ min.	C 60.9
	550 deg. F.—45 sec.	C 60.6
Purple	575 deg. F.—10 sec.	C 60.8
	600 deg. F.—5 sec.	C 60.0
	475 deg. F.—10 min.	C 61.0
	500 deg. F.—5 min.	C 60.4
	525 deg. F.—2 min.	C 60.6
Purplish Blue	550 deg. F.—1 min.	C 60.5
	575 deg. F.—30 sec.	C 60.7
	600 deg. F.—10 sec.	C 61.1
	625 deg. F.—5 sec.	C 61.2
	500 deg. F.—20 min.	C 59.8
Dark Blue	525 deg. F.—5 min.	C 59.9
	550 deg. F.—3 min.	C 59.5
	575 deg. F.—1 min.	C 60.1
	600 deg. F.—25 sec.	C 60.2
	625 deg. F.—8 sec.	C 60.5
Blue	550 deg. F.—10 min.	C 58.6
	575 deg. F.—2 min.	C 59.6
	600 deg. F.—1 min.	C 59.1
	625 deg. F.—15 sec.	C 59.8
	550 deg. F.—20 min.	C 58.3
Gray or Gun Metal	575 deg. F.—3 min.	C 59.2
	600 deg. F.—2 min.	C 58.5
	625 deg. F.—1½ min.	C 58.6
	575 deg. F.—20 min.	C 57.7
	600 deg. F.—5 min.	C 57.8
	625 deg. F.—3 min.	C 57.6
	600 deg. F.—20 min.	C 56.8
	625 deg. F.—20 min.	C 55.1

*Time intervals taken after specimen had reached uniform maximum temperature.

These data show the variations in hardness of 0.95C steel drawn to the same colors quickly and slowly. It is evident that the hardness varies but little for the same color produced by widely different time and temperature combinations.

By Temper Colors

By ALFRED HELLER
Commercial Heat Treater, New York

temper of any one of the test pieces was to drop it on the surface of the alloy covering the testing block. This molten alloy was kept in a mirror-bright condition, and it is evident that this method of tempering assured a free circulation of air around the test piece which resulted in a correct appearance of the temper colors of the test specimens.

Time Control Is Necessary

In order to control the time element it was necessary to determine the time required for a sample to reach the temperature of the block, and to start timing only *after* all parts of the sample have reached the block temperature.

The time required for a sample to reach the temperature of the block was determined in the following manner:

ALTHOUGH most metallurgists condemn the policy of drawing back to color, this formerly universal custom is still employed by a majority of small shops inasmuch as they are unable to afford both installations. Admittedly, temper colors are affected by the amount and kind of light, the eyesight of the observer, and the speed of heating, but a dis-

creet use of a color drawback is shown herein as a means of nicely controlling hardness within certain temperature ranges and for certain types and forms of steel. The author has produced several excellent hardness studies in the past and this article is one of the few authentic investigations made concerning the reliability of drawing to color.

ner: A small quantity of pure tin which melts at 449.5 deg. F. was soldered to one of the test pieces. When the block was held at 450 deg. F., it was found that the tin soldered to this

sample would melt in exactly 8 sec. Check results to plus or minus 1/2 sec. were easily obtained. Therefore, it required exactly 8 sec. for a test piece to become uniformly heated to the temperature of the block. In the following tests, therefore, the temperature may be considered as approximately correct to plus or minus 1 deg. F. and time correct to plus or minus 1 sec.

The drawing temperature was varied in steps of 25 F. deg. within the range of 425 deg. F. to 625 deg. F. The time periods were 5, 10, 15, 20 and 30 sec. and 1, 3, 5, 10 and 20 min.

When the tempering operation was completed each of the samples was immediately dropped into water in order to instantly check the draw. When the work was completed the samples were matched side by side for color and those of the same color were collected and hardness determined on the Rockwell tester.

From the results of these tests the temper color scale in Table I was produced which shows the Rockwell "C" hardness values for the same color produced by widely different time and temperature combinations. A study of this scale proves the interesting fact that the hardness for any color produced by different time and temperature combinations is approximately the same, as it can be seen that it varies by a maximum of about plus or minus one Rockwell "C" hardness number from the average hardness of the different combinations of time and temperature that produce any particular color. Therefore, it can be said that tempering by color automatically takes care of both time

(Concluded on Page 68)

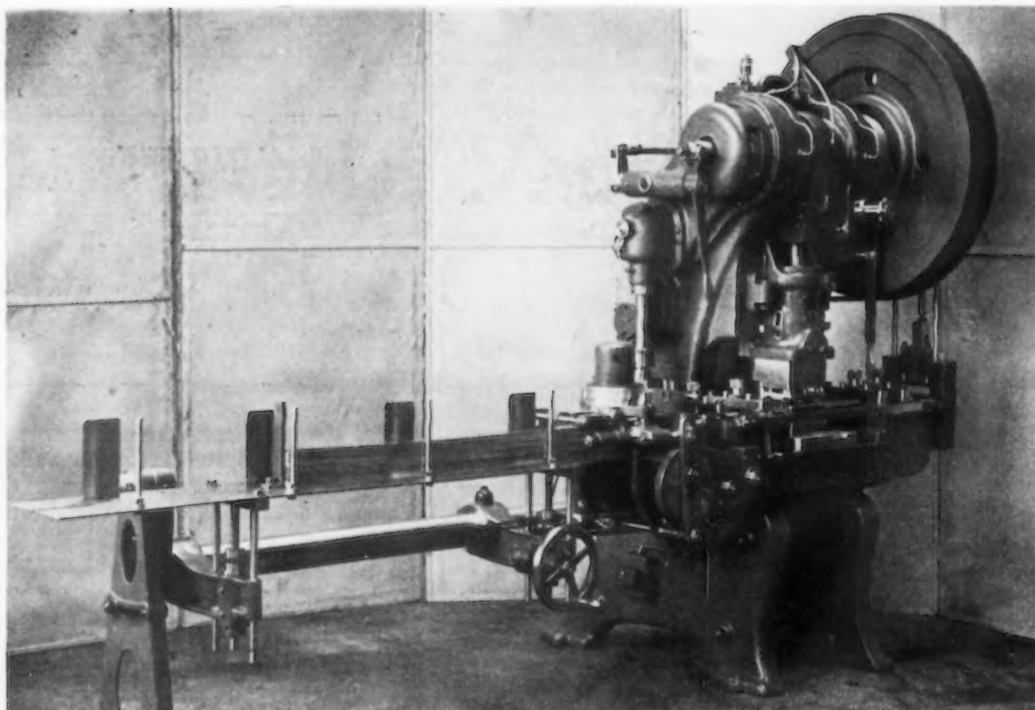
TABLE NO. II

Standard Temper Colors

(When polished steel is held for 5 min. at indicated maximum temperature)

Temper Color		0.80C Steel	1.00C Steel	1.20C Steel	Oil Hardening Steel
Very Light Straw	420 deg. F.	C61.9	C63.0	C63.9	C61 to 62
Very Light Straw	430 deg. F.	C61.7	C62.1	C63.6	C61 to 62
Light Straw	440 deg. F.	C61.3	C62.3	C63.3	C60.5 to 61.5
Light Straw	450 deg. F.	C61.0	C62.0	C63.0	C60.5 to 61.5
Full Straw	460 deg. F.	C60.8	C61.7	C62.7	C60.5 to 61.5
Full Straw	470 deg. F.	C61.6	C61.3	C62.3	C60.0 to 61.0
Dark Straw	480 deg. F.	C61.1	C61.0	C62.0	C59.5 to 60.5
Dark Straw	490 deg. F.	C59.8	C60.7	C61.7	C59.5 to 60.5
Very Dark Straw	500 deg. F.	C59.5	C60.4	C61.4	C59.5 to 60.5
Dark Straw with					
Reddish Cast	510 deg. F.	C59.2	C60.1	C61.0	C59.0 to 60.0
Reddish Purple	520 deg. F.	C58.7	C59.8	C60.6	C59.0 to 60.0
Reddish Purple	530 deg. F.	C58.4	C59.5	C60.2	C59.0 to 60.0
Purple	550 deg. F.	C58.1	C59.2	C59.9	C58.5 to 60.5
Dark Blue	560 deg. F.	C57.8	C58.9	C59.6	C58.5 to 60.5
Dark Blue	570 deg. F.	C57.5	C58.6	C59.2	C58.0 to 59.0
Blue	580 deg. F.	C57.1	C58.3	C58.8	C58.0 to 59.0
Blue	590 deg. F.	C56.8	C58.0	C58.5	C58.0 to 59.0
Light Blue	600 deg. F.	C56.4	C57.2	C58.0	C57.0 to 59.0
Light Blue	610 deg. F.	C56.1	C57.3	C57.7	C57.0 to 59.0
Grayish Blue	620 deg. F.	C55.4	C56.4	C57.0	C56.5 to 58.5
Grayish Blue	630 deg. F.	C55.0	C55.9	C56.6	C56.4 to 58.3
Gray or Gun Metal	640 deg. F.	C54.7	C55.4	C56.2	C55.8 to 58.0
Gray or Gun Metal	650 deg. F.	C54.3	C54.8	C55.8	C55.7 to 57.8

This table shows the Rockwell "C" hardness of four different steels drawn to color. Standard 0.80 C, 1.00 C, and 1.20 C, hardness values are shown, as well as the maximum and minimum hardness values obtained when testing twelve of the more popular brands of the so called high-manganese type of oil hardening non-shrinking steel. This latter class of steel is very extensively used by tool makers in making dies and punches. All the steels were heated uniformly to the indicated maximum temperature and then held for 5 min. At the conclusion of each draw, the temper color was as indicated to the left and the hardness value is given at the right.



Strip stock is fed to the press automatically by a vacuum apparatus. The feeding table, which is inclinable with the press, raises mechanically to compensate for the difference in height as the pile of strip decreases.

Inclinable Press Equipped with Automatic Strip Feed

THE feeding device employed is an outstanding feature of the inclinable press, illustrated, which has been placed on the market by the Schatz Mfg. Co., Poughkeepsie, N. Y. The machine has a variable speed of 70, 90, 140 and 180 strokes per min.

Strip stock is stacked on the feeding table as shown and fed to the machine automatically by means of a vacuum apparatus. The table is inclinable with the press, and is arranged to raise mechanically to compensate for the difference in height as the strip pile decreases. The strip is gripped by a double-sided precision grip feed, which in the machine illustrated has a fine stroke adjustment ranging from 0 to 4 in., and has capacity for strip stock up to 5½ in. in width. On the bed of the press the feeding apparatus consists of four grips, two on the outer side and two on the inner. The two outside grips slide back and forth, being driven by a rotating disk that incorporates the fine adjustment for length of feed. The two inside grips do not move back and forth but open and close in synchronization with the two outer grips and serve to hold the material while it is being punched. The clamping pressure of all the grips can be released by hand when necessary. In conjunction with this feed there is a patented strip gage against which the strip is pushed so that part punchings are eliminated.

A battery of these machines can be

served by one operator. In addition, increased production is claimed and considerable saving in materials is attributed to the precision grip feed. The strip table can be removed to permit feeding coiled material from a reel if desired.

The drive is through an adjustable multiple-disk friction clutch with brake, permitting single or continuous strokes. In the patented re-

versible multi-speed motor drive employed, additional speeds are obtainable through a variable-speed motor pulley arrangement engaging in two peripheries. The machine can be furnished with a scrap-shear, which may be disconnected when desired and an ejector can be had in the slide. Central lubrication from an automatic grease press is also available.

Specifications include: Maximum pressure, 45 tons; depth of throat from center of slide, 7½ in.; distance between slide and bed, stroke up adjustment up, 12¾ in.; stroke adjustment, 5/16 to 2¾ in.; adjustment of slide, 2¾ in.; area of slide, 8¼ x 7 in.; and area of bed, 22 x 14 15/16 in.

Variable-Speed Device For Fractional-Hp. Service

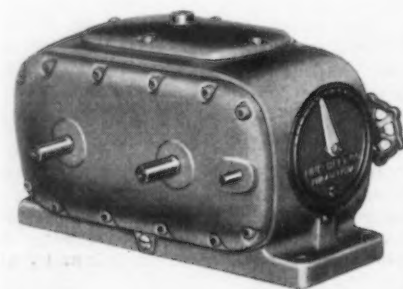
A SELF-ADJUSTING, positive variable-speed transmission for fractional horsepower duty, known as the Link-Belt V.R.D. (variable roller drive), is being announced by Link-Belt Co., Philadelphia, Chicago, as a

companion to its larger capacity P.I.V. gear variable-speed transmission, described in THE IRON AGE of Jan. 29, 1931.

The V.R.D., which is capable of ½ hp. output at maximum speed,



Side contact roller chain is employed in this variable-speed transmission, which is for fractional horsepower duty.



with a maximum ratio of speed variation of 10 to 1, continues such features as compact, all-metal construction; total inclosure; oil-bath lubrication; protection from moisture and grit; and the use of a chain for positive transmission of power. An individual feature is the construction and application of the chain used for transmitting the power from input to output shaft.

It is side-contact roller chain, consisting of steel links, made endless and connected by hardened steel pins

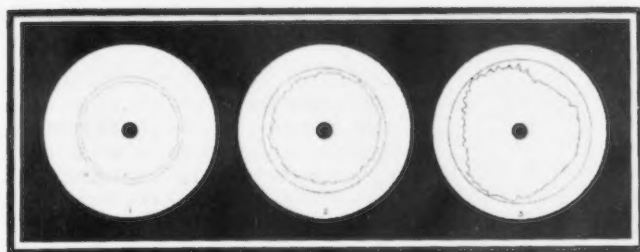
in hardened steel joint bushings.

Openings in each pitch of links provide a pocket for each of two hard steel rollers, and from both sides a portion of roller protrudes sufficiently to permit each pair of chain rollers, at each engagement of chain and wheels, to roll into contact with the hardened steel conical opposed disks forming the driver and driven wheels, until finally the chain is engaged positively in the wedge-shaped wheels at the proper pitch line for the speed desired on the output shaft. The dis-

engagement of chain also is a smooth, rolling action.

A speed indicator permits ready check-up on operating speed settings. Spring pressure applied to the two disks of one wheel serves to maintain correct tension and automatically compensate for chain wear.

The V.R.D. is furnished with horizontal or vertical box; with or without reduction gearing; and can also be supplied motorized, with motor forming an integral part of the unit.



Gear Testers Designed To Show Combined Errors

PARKSON Gear Testers for checking the accuracy of finished gears and gears in process of manufacture are being marketed by the George Scherr Co., 128 Lafayette Street, New York. They are designed to show the combined errors, and are made for spur, helical and bevel, as well as worm gears and worms. They may be used with a dial indicator for a quick visible check near the gear-cutting machine, or they can be equipped with an automatic recording device that furnishes a permanent red ink record on a circular chart.

The gears are tested in pairs, and although it is recommended that one be a template gear, this is not necessary. The pair of gears are mounted on stationary arbors, one of which is attached to a slideably mounted carriage that may be clamped in the desired position on the bed. The other arbor is mounted on a floating carriage which has limited movement longitudinally on the bed. This carriage rolls on three steel balls so that it will move under very slight pressure. At one end is an adjustable spring plunger and a regulating screw that permits adjusting the center distance of the two gears a definite amount. Another regulating screw at the other end of the floating carriage serves to limit or prevent motion. A scale is attached to the adjustable carriage and a vernier to the floating carriage. Correct center

distance is therefore always assured. Measurement is obtained directly in 0.001 in. by the unaided eye, the vernier being $2\frac{1}{2}$ in. in length.

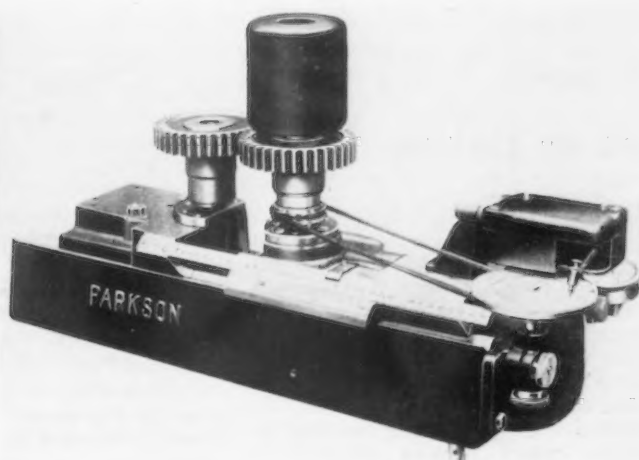
With the gears on the arbors, the adjustable carriage is moved to bring the teeth in contact, and then clamped to the bed. The adjusting screw is then regulated to give the desired pressure to the floating carriage, the spring plunger holding the teeth in close mesh. The center distance may then be read on the scale and vernier, and the gears may be rotated to judge the freedom and smoothness of the rolling action of the teeth.

If the floating carriage is not fixed by the regulating screws, but is only acted upon by the gear teeth on the one side and by the spring plunger on the other side, it will be found that as the gears are rotated, slight movements are imparted to the floating carriage. The extent of these movements, shown on the dial at the end of the bed, indicates any errors in the gears. The indicator readily shows the effect of thick teeth, involute or spacing errors, and interference on

bottom, which produce a jumpy or jerky action. Also, it shows not only improper mounting of gear blanks and run-out of arbors, but the extent of eccentricity by a corresponding deviation of the indicator from zero setting.

These testers perform several distinctive functions, not limited to the detection of gear errors and their correction only. The principle of sliding scale and vernier in reference to each other also makes it possible readily to measure the exact outside diameter of the gear blanks and their run-out before cutting.

When equipped with the recording device, a permanent record can be kept on every gear or set of gears, showing the combined errors on a circular graph charted within two concentric circles. It is stated that this arrangement of polar graph gives at a glance a perspective view of the running qualities of the gear, and the characteristics of the graph readily permit to analyze the individual errors, without further individual measurements.



Spur gear tester with circular chart recording device. Capacity between centers ranges from 1 to 9 in. Specimens of records made by the recording device are shown at the left of the tester. The one at the extreme left is that of a very good gear and that at the extreme right, that of a bad gear. The latter is of a 15-tooth pinion with a 45-tooth pinion, and the record indicates that the pinion is eccentric.



THE NEWS OF THE WEEK

Steel Wages Are 6 to 7 Per Cent Above 1929 Levels — Prices Still Well Below

IN a survey of the steel industry's operations since the adoption of its code made public by the American Iron and Steel Institute, it is disclosed that the current wage level in the industry is now 6 to 7 per cent higher than in the peak period of 1929, although prices are still far below the post-war high reached in 1923. The general wage increase in the steel industry which became effective on April 1 adds approximately \$3,000,000 monthly to the industry's payrolls. Hourly wage rates are now approximately 36 per cent higher than in June, 1933.

The number of workers in the industry is rapidly approaching the 1929 total of 420,000. Although the number had been reduced to 210,000 in 1932, it was back up to 365,000 in February, 1934, and men were being reemployed at the rate of 10,000 or more per month.

Prices Still Too Low

Despite general price increases on steel products announced early this month, the level of finished steel prices with such increases in effect is still 5 per cent below the 1929 level and 21 per cent below the 1923 peak. It is pointed out that the recent slight upturn in steel prices was preceded by a decade of steadily declining quotations. Steel prices began to fall in 1923 and continued to drop steadily until early 1933, when the price curve straightened out and ultimately turned upward. Even then the increase in steel prices lagged far behind the general wholesale commodity price index, which increased 21.9 per cent from February, 1933, to February, 1934, while finished steel prices rose but 5.4 per cent during the same period.

Such advances as have been made in steel prices have scarcely any effect at all on the general public. For ex-

ample, in the automobile industry, which is one of the heaviest users of steel, the cost of this commodity in the average small motor car is only \$31.41, or 4.6 per cent of the total cost of the car, though by weight steel is 78 per cent of the car.

Reviewing the operations of employee representation plans which are widely adopted by the steel industry, the institute announced that over the period from July, 1933, to October, 1933, 70 per cent of all matters taken up for discussion by these groups were decided in favor of the employees,

18.3 per cent against the employees, 7.1 per cent compromised and 4.6 per cent withdrawn.

Profits Begin at 45 Per Cent

Pointing out that ownership of the steel industry is distributed among 500,000 stockholders, the institute states that to earn any profit for stockholders it is necessary for the industry to operate at more than 45 per cent of capacity. To earn even 6 per cent, the industry must operate at the rate of 80 per cent capacity. For 1931, 1932 and 1933, the operating rate averaged 30.34 per cent of capacity. Under the code the operating figure has shown a healthy increase from the low average. The institute concludes that "any return to the destructive competitive practices of the past would make it utterly impossible for the industry to support the large financial burden imposed by the labor provisions of the code."

Durable Goods Output Above Seasonal Levels

PRODUCTION of both durable and non-durable goods increased more than seasonally in March and the first half of April, according to the monthly report of the conference of statisticians in industry of the National Industrial Conference Board. Notable gains were recorded in the automobile industry, building and engineering construction, steel and iron, bituminous coal mining, electric power production, and textile apparel manufacturing.

Production of passenger cars and trucks in the United States and Canada in March, estimated at 340,000 units, represented an increase of 40 per cent over February and a gain of 173 per cent over March, 1933. Automobile sales at retail, in reports from six States, gained 180 per cent over March, 1933. Motor vehicle exports for February were 120 per cent over those of a year ago.

Steel production continued to expand in March, after recording a sharp increase in February. Output

toward the end of March and in the early part of April diminished slightly, mainly because of threats of labor trouble. In the second week of April expanded output followed steel price increases and future buying of structural bars.

Building and engineering construction advanced sharply in March and showed an increase of 85 per cent over February, which was almost double the usual seasonal gain in these months. Residential building contracts awarded in March advanced 93.5 per cent over February, to the highest monthly total since April, 1932. Non-residential awards showed an increase of 100 per cent over the total in February.

Automotive Employment Higher in March

THE automotive industry in Michigan employed 275,777 persons during March as against 240,368 in February and 134,095 in March, 1933, according to reports of 117 manufacturers. The average weekly earnings

per worker last month were \$26.61, compared with \$25.72 during the previous month and \$16.72 in March of last year. The index of living costs of wage earners in Michigan manufacturing centers was at 74.1 in March. It was 73.5 in February and 67.7 in January. The monthly average in 1933 was 63.2, in 1932 it was 64.3, in 1931 it was 76.2 and in 1930 it was 93.3, with the 1923-1926 average taken as 100. All of these figures are based on reports compiled by the Department of Labor and Industry of the State of Michigan.

Pennsylvania to Electrify New York Area Yards

THE Pennsylvania Railroad will this year electrify its important freight terminals, yards and branch lines in the New York area, involving approximately 125 miles of track. The comprehensive project already is well under way.

The electrification of the Pennsylvania's freight trackage in the New York area is part of the road's \$77,000,000 employment and improvement program, financed by Public Works Administration, which includes the complete electrification of its New York-Washington lines, the construction of 101 electric locomotives for use on these lines and the building of 7000 all-steel freight cars. The road expects to complete its entire electrification program this year, making possible the inauguration of through electric passenger and freight train service on improved schedules between New York and Washington early in 1935.

Included in the trackage to be electrified in the New York area will be portions of the Harsimus Cove yard and piers at Jersey City and the trackage serving them; the Greenville yards and connecting trackage, the Meadows and Waverly yards near Newark, the Passaic freight line which detours freight trains around the passenger tracks at Manhattan Transfer and the trackage from Rahway to South Amboy, N. J.

Foundry Equipment Orders Increase

NET orders for foundry equipment during March reached the index figure of 75.4, 20 members reporting, according to the monthly report of the Foundry Equipment Manufacturers Association. This compares with 65.8 in February. The average of orders for the three months previous to March was 48.9 per cent. March shipments were 62.6 per cent as compared with 42.9 per cent in February.

MAPI To Meet in Cleveland May 14-15

A TWO-DAY meeting of manufacturers of machinery and machine parts, to be held at the Hotel Cleveland, Cleveland, May 14 and 15, which is expected to play an important role in determining plans under code operations of the machinery industry, as well as its new place in national rehabilitation, will be conducted by the Machinery and Allied Products Institute. Permanent code authority for the machinery and allied products industry will be elected at this meeting.

Among those who are expected to take an active part in the sessions are George H. Houston, president, Baldwin Locomotive Works, and chairman of the Durable Goods Industries Committee, recently created at Washington; James W. Hook, president, Geometric Tool Co. and vice-chairman of the same committee; George W. Torrence, president, Link-Belt Co.; and prominent executives in all of the nationally known companies producing heavy equipment.

The importance of the meeting is reflected in the fact that the companies to be represented normally employ more than 350,000 workers and have a collective capital investment of three and a half billion dollars. While some of these concerns have recently reported gratifying improvement following increased demands in the automobile and railroad fields, a good proportion are still dependent upon the durable goods recovery deliberations for any substantial upturn. Discussion of proposals to extend to the heavy equipment and durable goods field, in general, trade stimulation aids is expected to make the Cleveland meeting of high importance in the shaping of recovery plans for the machinery industry.

Gear Makers Arrange Annual Meeting Program

ADDRESSES and papers planned for the annual meeting of the American Gear Manufacturers' Association, to be held at the Penn-Lincoln Hotel, Wilkesburg, Pa., May 3-5, include:

Economical Advantage of the Single Helical Gear, by R. S. Marthens, Westinghouse Electric & Mfg. Co., East Pittsburgh.

Recent Development in Gear Steels, by T. R. Rideout, Westinghouse Electric & Mfg. Co.

A.G.M.A. Speed Reducer Rating Formula and Its Development, by W. P. Schmitter, Falk Corp., Milwaukee.

Noise Measurement of Gears, by Prof. F. A. Firestone, University of Michigan.

Controlling Costs, and Employee Compensation, by W. A. Barr, Foote

Bros. Gear & Machine Co., Chicago.
Selling Gears to Special Fields, by L. A. Graham, Falk Corpn.
Commercial Standards, by E. S. Sawtelle, Tool Steel Gear & Pinion Co., Cincinnati.

The Machine Hour Rate—its Importance and Computation, by Prof. C. L. Van Sickle, University of Pittsburgh.

A feature of the annual banquet, to be held on the evening of May 4, will be an address on "The Future of Private Enterprise," by Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt. A session devoted to discussion of the industry's Code has been arranged for the morning of May 5. H. H. Kerr, president of the Boston Gear Works, Inc., North Quincy, Mass., and chairman of the Code Authority of the gear manufacturing industry, will preside, and speakers will include Howard Dingle, president, Cleveland Worm & Gear Co.

E. W. Miller, chief engineer, Fellows Gear Shaper Co., and president of the association, will preside over the meeting. B. F. Waterman, engineer, Brown & Sharpe Mfg. Co., Providence, R. I., and honorary president of the association, is chairman of the program committee. J. C. McQuiston, First National Bank Building, Wilkesburg, is secretary-manager of the association.

Sheet Steel Sales Lower in March

SALES declined while production and shipments of sheet steel products in March reflected gains, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. In this survey, which is based on figures covering a monthly capacity of 325,000 net tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, independent makers reported sales of 158,244 net tons in March, compared with 184,355 tons in February; production of 220,282 tons, against 194,830 tons, and shipments of 200,701 tons, compared with 146,905 tons. Unfilled tonnage on April 1 totaled 159,672 tons, or 49.1 per cent of capacity, compared with 206,292 tons or 63.5 per cent of capacity in the preceding month. The March report with comparisons of the two preceding months in net tons follows:

	March	Feb.	Jan.
Sales	158,244	184,355	209,463
Production	220,282	194,830	163,622
Shipments	200,701	146,905	130,878
Unfilled orders	159,672	206,292	166,182
Unshipped orders	57,212	53,630	51,388
Unsold stocks	57,722	63,600	54,922
Capacity per month	550,000	550,000	550,000
Percentage reporting	59.0	59.0	59.0
Percentages, Based on Capacity			
Sales	48.7	56.7	64.5
Production	67.8	60.0	50.4
Shipments	61.8	45.2	40.3
Unfilled orders	49.1	63.5	51.2
Unshipped orders	17.6	16.5	15.8
Unsold stocks	17.8	19.6	16.9

British Iron and Steel Federation Formed—Demand Continues Heavy

LONDON, ENGLAND, April 24 (*By Cable*).—Pig iron is still quiet, but heavy production is maintained, and early expansion in demand is anticipated. Hematite output is strong, and contracts are booked into the second half of the year.

Steel is very active, particularly bars, billets and rails, while structural shapes are improving. Export demand is much heavier and important orders have been booked from Russia, South Africa and China. The British iron and steel reorganization scheme and the formation of a British Iron and Steel Federation have been definitely approved. The main objects are the promotion of maximum manufacturing and commercial efficiency and the expansion of export trade. The new federation consists of a council of 29 with executive, parliamentary, transport, tariff and research committees. The first executive committee meeting will be held May 3.

Tin plate is quiet in view of the uncertainty over effects of the iron and steel reorganization. Home inquiry is fair.

Continental iron and steel markets are dull, semi-finished steel and joists are fairly active, but bars, plates and sheets are listless. The favorable

British budget is expected to increase demand. The International Tube Cartel has booked large Russian contracts. The International Wire Export Co.'s shipments declined further during April and a delegation to visit and study overseas markets has been named.

The Belgian market is quiet, and negotiations with Soviet Russia regarding rolled steel contracts have been broken off. A French hematite sales office is to be formed by May 15, preliminary to the formation of a French pig iron syndicate.

Navy Awards Rivets of Exacting Specifications

AWARD of 400 tons of rivets to be made in accordance with new specifications for six warships has been made to the Champion Rivet Co., Cleveland, by the Navy Department. With close tolerances called for the specifications are regarded to be the most exacting ever issued by the Navy Department. The rivets are to have high button type head and the head must be concentric with the shank within limits of .020 in. under size and .012 in. over size for rivet sizes from 3/4 in. to 1 in. The close limits necessitate the making of the rivets practically without fins. Each rivet will be gaged for size by the use of a special ring gage. Seventy tons of rivets will be of high tensile manganese steel and the remainder of medium tensile steel. The order covers all the rivets required for the naval vessels, *Brooklyn, Erie, Cassin, Shaw, Philadelphia and Charleston*.

David Lupton, Inc. Is Organized

DAVID LUPTON, INC., is the title of an organization recently formed in Philadelphia to deal in a wide line of metal products. David D. Lupton is president, David P. Forstner, secretary, and Edward L. Forstner, treasurer. All were identified with the David Luptons Sons Co., recently liquidated. The new concern will function principally as sales representative. It now represents the Fred Medart Mfg. Co., St. Louis, with its line of steel shelving, lockers, cabinets, etc., and the Toledo Metal Furniture Co. It will handle hosiery and factory equipment, sheet metal specialties, steel store fixtures, Monel metal specialties, wire mesh products, bench legs, etc.

The company will maintain an en-

gineering contract department for the development of special and automatic machinery, consulting work and the installation of Diesel power plants. It has offices and warerooms on Wyoming Avenue at Second Street, Philadelphia.

Mott Plant Purchased For Possible Reopening

THE plant of the J. L. Mott Iron Works, Hancock Avenue, Trenton, N. J., heretofore owned by a realty holding company, has been acquired by Harry A. Robinson, 300 Morris Building, Philadelphia. The purchase includes group of buildings, totaling about 1,000,000 sq. ft. floor space, on 18-acre tract of land, with equipment and fixtures, previously used for manufacture of brass goods and other plumbing equipment and supplies, bathtubs, etc. Purchaser is in negotiation with foreign interests, which propose to take over plant, remodel, improve and reequip for same line of production.

Porcelain Enamel Group To Meet at Cleveland

THE fourth annual meeting of the Porcelain Enamel Institute will be held at the Hotel Statler, Cleveland, May 16 and 17. Among those scheduled to speak are: Bennett Chapple, vice-president, American Rolling Mill Co.; William Hogenson, president, Chicago Vitreous Enamel Product Co.; E. L. Lasier, vice-president and general manager, Titanium Alloy Mfg. Co., and R. A. Weaver, president, Ferro Enamel Corp.

Adding to the interest of the meeting will be the election of the porcelain enameling manufacturing industry's supplementary code authority, which will be charged with the administration and enforcement of the industry's supplementary code of fair competition, in effect since April 10.

Ohio River Steel Shipments Higher

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in March amounted to 47,897 net tons, contrasted with 4373 tons in February, 54,109 tons in January, and 32,917 tons in March, 1933, according to the latest report of the United States Engineer Office at Pittsburgh. Shipments of steel products on the Monongahela River in March aggregated 40,685 tons, compared with 12,429 tons in February, and 19,546 tons in March, 1933. Shipments of iron and steel on the Allegheny River in March totaled only 2180 tons.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton			
Ferromanganese, export	\$9		
Billets, open-brth. \$5 10s.		to	\$5 15s.
Tin plate, per base box	16s.	6d. to	16s. 9d.
Steel bars, open-hearth	\$7 17 1/2s.		
Beams, open-brth. \$7 7 1/2s.			
Channels, open-hearth	\$7 12 1/4s.		
Angles, open-hearth	\$7 7 1/2s.		
Black sheets, No. 24 gage	\$9 5s.		
Galvanized sheets, No. 24 gage	\$11 5s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £			
Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.			
Billets, Thomas ..	\$2 7s.		
Wire rods, No. 5 B.W.G.	\$4 10s.		
Steel bars, merchant	\$3 5s.		
Sheet bars	\$2 8s.		
Plates, 1/4 in. and up	\$4		
Plates, 3/16 in. and 5 mm.	\$4 2s. 6d.		
Sheets, 1/4 in.	\$4 7s. 6d.		
Beams, Thomas ..	\$3 1s. 6d.		
Angles (Basic) ..	\$3 2s. 6d.		
Hoops and strip steel over 6-in. base	\$4 2s. 6d.		
Wire, plain, No. 8 ..	\$5 7s. 6d.		
Wire nails	\$5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G. ..	\$8 15s.		

PERSONALS

E. J. PAULUS has been elected vice-president of the McClintic-Marshall Corp., in charge of operations, Bethlehem, Pa., succeeding the late Col. E. A. Gibbs. Mr. Paulus was formerly manager of the Chicago district and has been with the company during his entire business career. He started work as a draftsman shortly after his graduation from the University of Wisconsin in 1911 and became assistant to the sales manager of the Chicago office the following year. During the succeeding years he was head of the contracting office in Cincinnati, was made assistant manager of the Rankin works of the company near Pittsburgh and later was put in charge of the structural shop at Leetsdale. In 1921 he again entered sales work, at Pittsburgh, and in 1922 was placed in charge of sales in Detroit, where he was appointed engineer of construction on the Detroit River Bridge in 1926. Upon completion of that job in 1928, he was made manager of the Chicago district in charge of both sales and operations.

ROBERT MACMINN, heretofore manager of the Eastern district of the corporation, has been appointed manager of the Chicago district. He has been identified with the McClintic-Marshall organization since 1907, when he received his C.E. degree from Lehigh University. After a series of jobs in the drawing room, shops, erection and engineering divisions, he was placed in charge of estimating and designing in 1915. Mr. MacMinn took care of the preliminary work on the George Washington Bridge and in 1928 succeeded Mr. Paulus in the work on the Detroit River Bridge. Prior to going to Bethlehem in 1930, Mr. MacMinn was assistant general manager at the Pottstown works.

FRANK CARY has been added to the sales engineering staff, with headquarters in Hartford, Conn., and covering Connecticut and western Massachusetts, by the ParKett Machinery division of the Austin-Hastings Co., Inc., Cambridge, Mass.

THOMAS F. KELLY, of Brooklyn, has been elected chairman of the local control board which will operate under the Scrap Iron Code, for New York and surrounding territory. GEORGE BETTEN, of S. Betten & Sons, Inc., has been elected secretary-treasurer.

A. J. HOWELL has been appointed manager of the Pacific Coast district of Revere Copper & Brass, Inc., New York, to succeed R. H. BINNS, JR., who was recently moved to the executive offices as assistant general sales manager. Mr. Howell has been with



E. J. PAULUS



ROBERT MacMINN

Revere on the Pacific Coast since the opening of an office there in 1932 and for many years previously represented the Rome division of the company in that territory. His headquarters will be in the Russ Building, San Francisco.

ISHAM KEITH, formerly identified with the Bethlehem Steel Co., Baldwin Locomotive Works and the Pratt & Whitney Co., has been made administration member for the wrench manufacturing industry code authority.

CHARLES G. SCHOTT has joined the St. Louis sales staff of the Bethlehem Steel Co. Mr. Schott formerly was secretary and sales manager of the Wilson Stove Co., Metropolis, Ill., and previously sales manager of the St. Louis office of the Republic Iron & Steel Co. until 1927.

GEORGE A. NEESHAM, of the Wyckoff Drawn Steel Co., has been elected president of the Purchasing Agents

Association of Chicago. Other officers chosen were: First vice-president, GEORGE BIRKENSTEIN, of S. Birkenstein & Sons, Inc.; second vice-president, JOHN H. MOHR, John Mohr & Sons; national director, E. L. VAN VECHTEN, United Air Lines; treasurer, A. JARMAN, Y. M. C. A.; secretary, FREDERICK G. HEASLIP, Fairbanks, Morse & Co.

JOHN M. WILSON, president, Spang-Chalfant Co., Pittsburgh, has been appointed administrative member of the code authority for the gear manufacturing industry. He succeeds NEAL W. FOSTER. Mr. Wilson is also president of the National Supply Co. of Texas and a director of the First National Bank of Pittsburgh, and the Peoples-Pittsburgh Trust Co.

CHARLES LUKENS HUSTON, vice-president, Lukens Steel Co., Coatesville, Pa., was tendered a dinner by the Rotary Club of Coatesville last week. He was presented with a handsome remembrance and the evening was devoted largely to reminiscing about the Lukens company.

HERMAN F. KLUENDER has been elected vice-president of the Detroit Alloy Steel Co. He has been sales manager of the company. EDWARD A. KRELLER, works manager, has been elected to the board of directors.

F. G. GUTHRIE, who for the past seven years has been in the Detroit office of the Westinghouse Electric & Mfg. Co., has become associated with R. L. GOMON, 2842 West Grand Boulevard, Detroit, to represent Electric Machinery Mfg. Co., in the eastern Michigan territory.

P. DAMIRON, of A. T. Kathner, P. Damiron, Paris, European representatives of the Cold Metal Process Co., Youngstown, and P. BLAIN and M. THOMAS, chief engineer and works manager respectively of Acieries et Forges of Firminy, France, have been visiting the Cold Metal Process Co. and inspecting installations of Steckel Mills. G. L. T. STERKEY, of Fagersta Bruks Aktiebolag, of Sweden, has also been visiting the Youngstown company.

WILLIAM D. WARD has been appointed administration member for the die casting manufacturing industry code authority. He was formerly identified with the Pelton Water Wheel Co., and when the Atlantic department of the company was taken over by William Cramp & Sons Ship & Engine Building Co., Philadelphia, Mr. Ward continued in charge of Pelton sales until 1932.

Four New Commercial Resolutions Approved by Institute

DEDUCTIONS in the base price of wrought iron pipe sold to railroads for the manufacture of railroad cars or locomotives or parts thereof are permitted by commercial resolution No. 55, approved by the directors of the American Iron and Steel Institute on April 12 and effective April 19. The deduction shall not exceed the amount similarly allowable to accredited jobbers plus an amount not exceeding the amount of the approved extra or extras for cutting, threading and coupling. The resolution requires code members to secure an agreement in writing from purchasing railroads to the effect that such pipe will be used for no other purpose. If the pipe is used for another purpose the railroad agrees to pay damages to the amount of \$10 a ton.

Pacific Coast Ports

RESOLUTION No. 56 provides for the publication of rail and ocean freight tariffs to ports on the Pacific Coast not included in the institute's published freight tariff book and deems such destinations to be Pacific Coast ports within the meaning of the term as used in resolution No. 8.

Sales for Scrap Defined

THE sale of products as scrap for any other use by the purchaser than the remelting thereof is termed a violation of the code by commercial resolution No. 57. Penalty is provided by deeming such a sale the sale of a product at a price less than the price for such product determined by the provisions of section 4 of schedule E of the code.

Use of Freight Tariff No. 2

DETERMINATION of delivered prices by the use of any freight tariffs lower than those set forth by the institute in Freight Tariff No. 2 is to be considered presumptive evidence of violation of the provisions of section 4 of schedule E of the code, according to resolution No. 58. It is pointed out that this publication is kept up-to-date and that copies are apparently in the hands of all members of the code. The ruling is effective on May 15.

Resolutions 25 and 46 Amended

RESOLUTION No. 25, which interprets and construes schedule G of the code with respect to maximum rates of discount for early payment and maximum periods of free credit on products shipped to the Pacific Coast from plants east of the Mississippi River, was revised on April 12. It applies now only on products ship-

ped by ocean transportation through Atlantic or Gulf ports to Pacific Coast ports or through Pacific Coast ports to inland Pacific Coast destinations.

Extension of quantity differentials on merchant bars for delivery in Colorado, Montana, New Mexico, Utah and Wyoming to May 31 is provided by resolution 46, as amended April 12. These differentials, amounting to 25c. a 100 lb. on lots of 1000 to 2000 lb. and 50c. on lots of less than 1000 lb., were arbitrarily established to provide relief from differentials effective elsewhere for consumers in that area whose purchases are usually very small.

▲▲ OBITUARY ▲▲

WALTER D. WOOD, president of R. D. Wood & Co., Philadelphia, died of heart disease in Washington on April 20, aged 84 years. He was a son of Richard Davis Wood, founder of the company in 1803. After his graduation from Haverford College in 1867, he took post-graduate work at Harvard University and later became identified with his father's firm. Mr. Wood was actively interested in civic affairs throughout his life, having served in 1880 on the Committee of One Hundred to improve local gov-



WALTER D. WOOD

ernment conditions. In recent years he had been an active proponent of the plan to build a ship canal across New Jersey to connect the Delaware River with Raritan Bay. He was a member of a number of technical societies, including the American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Society

for Testing Materials and the American Waterworks Association.

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ALBERT J. O'BRIEN, president of the Pacific Coast Forge Co., died of a heart attack in San Francisco on April 10, aged 46 years.

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E. H. BRUNER, treasurer of the Chicago Wheel & Mfg. Co., Chicago, died early in April at the age of 61 years. In 1896 he became associated with **HENRY E. MILLER**, the founder and president of the company.

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CLEMENT A. HARDY, a mechanical engineer who specialized in foundry work, died recently at Chicago. At one time Mr. Hardy was sales manager for the Whiting Corp., Harvey, Ill., having held that position for about 10 years. Later he served the company as a special selling representative.

Gray Iron Code Authority Named

WITH the election of two representatives from non-members of the Gray Iron Founders' Society, selection of the code authority for the gray iron foundry industry has been completed. Six representatives had previously been chosen from the board of directors of the Gray Iron Founders' Society, Inc., Cleveland.

The code authority of the industry is now constituted as follows:

W. C. Connelly, for many years president of the D. Connelly Boiler Co., Cleveland, Administration representative; **G. D. Branston**, assistant secretary and treasurer, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; **F. R. Hoadley**, vice-president, Farrel-Birmingham Co., Inc., Ansonia, Conn.; **C. B. Magrath**, president, North Western Foundry Co., Chicago; **Col. Geo. M. Morrow**, president, Goslin-Birmingham Mfg. Co., Inc., Birmingham; **B. R. Pearse**, secretary and treasurer, Atlas Foundry Co., Cleveland; **A. B. Root, Jr.**, assistant general manager, Hunt-Spiller Mfg. Corp., Boston; **William Taylor**, president, Taylor & Co., Brooklyn, and **W. H. Winters**, general superintendent of foundries, American Brake Shoe & Foundry Co., New York.

The first steel was recently rolled in the Federal-aided South African Iron & Steel Corp., at Pretoria. A large blast furnace was blown in on March 7 to supply the new mill with the necessary iron. A number of improved coke ovens have been operating for several months, and the mill is said to have large supplies of coke.



Iron and Steel Code Again Attacked

*National Recovery Review Board, Headed by Clarence Darrow,
Begins Inquisition—General Johnson Opposes
Basing Point System*

WASHINGTON, April 24.—The inquisition of the steel industry by the National Recovery Review Board was suddenly and unexpectedly terminated Tuesday morning. Haled last week before this supposedly quasi-judicial body, headed by the venerable Clarence Darrow, well known Chicago attorney, it was sternly, even bitterly, required to give an account of its operation under the NRA code. Efforts of H. A. Moore, counsel for the American Iron and Steel Institute, to present fully a sequential explanation of purposes of code provisions and their interpretations frequently met with curt remarks from some member of the "court" that cut short both himself and witnesses for the industry. Even less tolerant was the attitude of Counsel Mason for the board. The orderly and intelligible presentation attempted by Mr. Moore was repeatedly the source of objection by Mr. Mason, who complained of the procedure. In most instances he was sustained by the court. The impression was plainly given that the steel industry had been prejudged before the trial. The principle of the English common law that the defendant is innocent until proved guilty appeared to be reversed.

Declaration by General Hugh S. Johnson that the basing point system of the industry is probably wrong also created speculation in the industry as to the possibility of his favoring its abandonment. It may have been a mere coincidence that he made this observation simultaneously with the review board hearing and that the two

had no connection. Nevertheless, the development set up an uncertainty as to a possibly new position into which the steel code may be placed. At the same time, General Johnson stoutly defended the steel code as one of the best examples of how the New Deal is working and in striking contrast to the report of the Federal Trade Commission report on the code, the Administrator cited correspondence from small units of the steel industry which praised it as protection from oppression to which the commission said the smaller companies are subjected.

Board Believes Code Oppresses Small Enterprise

Perhaps not all, but apparently the majority of the members of the review board are insistent that large units of the steel industry shall be shown guilty of using the code to "oppress small enterprise" and to promote monopoly. That was the theme of the Federal Trade Commission report on the steel code, and it is around this report that the so-called hearing centers. Riddle it as they will, Mr. Moore and witnesses are finding that the commission document remains in the eyes of its staunch supporters on the board as a care-

fully considered, accurate study of the steel code. This is despite the relatively cursory "investigation" made by commission agents and the defects in the report which have been and are being brought out.

Considering the personnel of the board one is forced to doubt that its knowledge of the iron and steel industry is very profound. While acquaintance with the industry would be helpful, absence of an understanding is not an indictment of the board, for it hardly can be expected to have knowledge of all industries of the country. Inasmuch as it is delving into all sorts of codes, an apparently endless task, it cannot be expected to single out any individual industry to gain special knowledge about it. The difficulty lies in the apparent indifference to the knowledge when offered. Members of the board in addition to Mr. Darrow are W. W. Neal, Marion, N. C., hosiery mill operator; Fred P. Mann, Devil's Lake, N. D., department store operator; John F. Sinclair, New York, former newspaper man; Samuel C. Henry, Chicago druggist, and W. O. Thompson, Chicago attorney. Mr. Sinclair, who is reported to be at odds with majority members of the board on a number of questions, has been absent from the hearings.

Hearings Really Began April 4

The hearings on the steel code really started on April 4, when a steel consumer of Duluth, Minn., attacked the basing point system. They were adjourned until last Thursday,

By L. W. MOFFETT
Resident Washington Editor
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continued over Friday and resumed this week. The steel industry is a big mark to shoot at and, moreover, it is in the unique position of being the only industry whose code has been made the object of a "study" by a Government body other than the NRA.

In attacking the steel industry in its report, the Federal Trade Commission found ready supporting response from the recovery review board which appears only too anxious to knock its parent, the NRA, into a cocked hat. It is understood the review board's report will assail codes generally and in doing so it necessarily will attack the NRA, for it was under the NRA, with presidential approval, that codes came into being.

General Johnson Will Defend Codes

It is understood that General Johnson will come to the defense of the codes in reply to the review board's report to the President. The Administrator also, it is said, will make a report in support of the steel code generally, though he has said the "basing point is probably wrong." So the locking of horns among Government bodies appears to be near at hand and the deciding of the winner apparently will rest with the White House. It is a situation that may mean much to the future of the NRA. Its rather rebellious child, the Review Board, was set up "to ascertain and report to the President whether any code or codes . . . is designed to promote monopolies or oppress small enterprises . . ." and it is authorized to recommend changes in codes to the President "as in the opinion of the board will rectify or eliminate such results." It is a question as to how much consideration will be given to such recommendations by the board.

In his remarks concerning the basing point, General Johnson made it clear that his mind is open and that he is not "excited" about the system, which seems to have "excited" the commission and the recovery review board. Moreover, he has said he will answer the Commission report on the steel code and it is to be assumed that his mind being open, he will be as ready to listen to defense of the basing point system as to attacks on it. His inclination to think the system is "wrong," however, sets up an uncertainty over his attitude on the question.

The General made his remarks before a meeting of the American Society of Editors where he engaged in some peppery discussion and strongly supported NRA against what he considered the unfair criticism of the organization.

Codes Only Experimental

In outlining the purposes of codes, which, he said, give no vested rights, but are experimental and subject to

change, General Johnson stated that this was the essential thing that he does not think lots of people "get." "They think there is something where monopolies come in and conspire and lay down a rule that will shackle business forever," he said. This line of reasoning appears to fit exactly that reflected by the Federal Trade Commission and by the recovery review board. And, though he may not have had either in mind when he made the observation, General Johnson immediately made reference to the Commission report, and the basing point system.

"For instance," he said, "take this Federal Trade Commission report on the steel code. We know there are a few things the matter with the steel code, but, generally speaking, I don't think a great deal. The basing point probably is wrong; we knew that from our attendance at the steel code authority meeting, but I am not going to get too excited about it; I am going to be sure. When it is necessary to change one of these things we are going to change.

"If you don't have that, what are you going to have? I don't know any better way to do it. I don't mean to say that all kinds of mistakes haven't been made, and probably there are rotten provisions in these codes, but if there are rotten provisions in the codes they are up there as a target for anybody that wants to shoot at them. If they can show they are rotten we will change them."

Previously, the speaker had defended the NRA against charges of oppressing small enterprises and in doing so turned to the steel code to support his contention. He referred to the fact that "eminent statesmen of the opposition have carried as their theme that we (NRA) are driving the small man out of business and benefiting only the other fellow." He answered with correspondence he had received from small steel companies in defense of the steel code.

"I do not recall that any of your representatives have asked us whether there was any foundation for this hypothesis so often and so emphatically promulgated," said General Johnson. "Yet I have in my office available to any of your people who are sufficiently interested innumerable reports from minor members of the great industries expressing their satisfaction with the situation. For example, the steel industry is really one of the best examples of how the New Deal is working. Let me quote a few recent expressions." The expressions quoted were published in THE IRON AGE of March 29, page 36-F.

The single witness at the hearings before the NRRB was Walter S. Tower, executive secretary of the American Iron and Steel Institute,

whose board of directors make up the steel code authority, the board functioning as two distinctly separate entities.

Mr. Moore, through Mr. Tower, though constantly balked in his effort, made some progress in answering points made in the Federal Trade Commission report on the steel code. Part of the first day was given to an explanation by Mr. Tower of the basing point system. He cited the 59 basing points under the code and the efforts being made to sell iron and steel in a way which would be equitable to both mills and consumers. The importance of this system as a means of continuing competitive conditions rather than turning to a blanket f.o.b. mill or delivered price basis, with its difficulties, was pointed out.

When Mr. Moore was endeavoring to present the industry's case in an orderly fashion he came into conflict with Mr. Darrow, who was then presiding. Mr. Moore finally declared that he did not have the slightest idea "what you want," and said he proposed to proceed with testimony by Mr. Tower. Counsel Mason said this plan would be all right.

Darrow "Getting Nowhere"

"You'll get nowhere," said Mr. Darrow. This observation was made after he had previously said with some irritation that the board had listened all day to "Mr. Tower and he has told us nothing." This reflected the spirit of other members of the board. It seemed to be a spirit of not wanting to learn anything for Mr. Tower presented a clear statement of facts, and lucid explanation. Mr. Mann objected that Mr. Moore was "dilly-dallying" and contended efforts were being made to evade answers, a rather remarkable statement in view of the complete and direct statements made by Mr. Tower.

At the Friday afternoon session Mr. Darrow left the hearing and Mr. Thompson took the chair, showing more tolerance and fairness. With the approval of Counsel Mason, Chairman Thompson accepted bulky documents presented by Mr. Moore. They included the certificate of incorporation of the American Iron and Steel Institute, a certificate showing the increase in the number of directors of the institute, its constitution and by-laws, resolutions adopted under the code, freight rate schedules, etc. Mr. Moore also offered to present a complete record of minutes of the board since approval of the code and these are to go into the record.

Jobbers Not Penalized

To reply to a charge in the Federal Trade Commission report that the code penalizes jobbers, Mr. Moore pointed out that the code specifies that jobbers may be granted any dis-

count a member of the code chooses to make if it is specified in the bill what the discount is from the base. Jobbers, he said, must agree not to split the discounts. He said the purpose is to protect members of the code and jobbers against splitting of commissions. Mr. Moore explained that the code provides broad power to smooth out rough points and that under this provision resolutions had been issued. Extras above and deductions below base prices, he stated, are made uniform in order to close the avenue to price cutting. The reason for extras and deductions was explained. Quality, size and dimension were cited as the controlling characteristics.

Mr. Tower said that as far as he knew the commission's investigation did not relate to any activities of the institute. In reply to a request to explain what the commission agents did, he said they came to the office of the institute in New York and asked permission to consult its files. He stated that the files had nothing to do with the institute but related only to the iron and steel code and were examined over a period of four or five days. Copies of the files were given the commission agents. "I was not asked for an explanation of these files," said Mr. Tower, "but offered to give one."

Institute Activities Described

Activities of the institute were described by Mr. Tower, the principal point made being that it meets twice yearly, does not deal with commercial questions but compiles statistics, hears technical papers and publishes an iron and steel works directory. To refute the commission claim that the board of directors had delegated broad authority to committees, he said the board had delegated certain duties as to functioning when it is not in session, and in the face of protest from Counsel Mason, Mr. Moore got into the record the fact that authority given committees is limited.

Asked if the United States Steel Corp. has approximately 40 per cent, the Bethlehem Steel Corp. 13 per cent, and eight other concerns about 30 per cent of the voting strength under the code, Mr. Tower replied emphatically in the negative. This rejoinder was an answer to the false calculation in the commission report which estimated voting strength on ingot capacity.

"Do 50 concerns other than the 10 referred to control the balance of the voting strength?" asked Mr. Moore.

"Obviously, no," replied Mr. Tower.

"Why obviously no?" Mr. Moore inquired.

"Because every member of the code has at least one vote and there are 249 members," Mr. Tower responded.

Actually, voting strength is based on domestic sales in 1932, and even if

combined, that of the United States Steel Corp. and the Bethlehem Steel Corp. would be only about 35 per cent, made up of 25 and 10 per cent respectively.

In reply to another question, Mr. Tower said he knew of no vote having been taken since the code was adopted. Mr. Tower said the commission agents had not asked him to give them information as to voting strength of members of the code.

Cross-Examination Tedious

In tedious cross-examination, Mr. Mason, after some confusion, learned the names of United States Steel Corp. subsidiaries which are members of the code and asked Mr. Tower as to whether officers of these companies were at code conferences. The general nature of the question made it difficult to answer, but in several instances Mr. Tower recalled the presence of some of them. Apparently the idea was to bring out the part officials of the Steel corporation take in code conferences. Mr. Mason asked that William J. Filbert, chairman of the committee on statistics for the institute and chairman of the finance committee of the United States Steel Corp., be summoned to testify at the hearing. He also asked for the presence of L. V. Collings, secretary of the institute.

Request likewise was made that Mr. Tower produce a letter, which the commission report says was written on Jan. 8, by the Taylor Forge & Pipe Works, Chicago, to J. J. Kennedy, vice-president in charge of sales, National Tube Co., Pittsburgh. At the time Mr. Kennedy was also chairman of the tubular goods committee. The letter referred to quotes the Taylor company as saying it had "tentatively decided to file present Pittsburgh base discounts as our discounts, f.o.b. Gary, with no change in our price practice when we quote on business normally based on Pittsburgh." The commission report said a note placed on this letter by the assistant sales manager of the National Tube Co. stated "there is no reason why anyone cannot file the same base price Gary as Pittsburgh-Lorain. They will have a \$4 advantage." Mr. Mason asked Mr. Tower to produce this note also. Mr. Tower said he would if he could find it in the files but said he did not know that it is in the files. Mr. Moore also said the note may not be a part of the institute files.

Mr. Mason asked Mr. Tower about present rate of steel operations, the rate before the code was adopted, changes in prices, etc., and then inquired as to the basing points on sheets. This was designed to take up the commission complaint that Youngstown is not a basing point for sheets. Mr. Tower, after naming the basing points for sheets, said he had never heard of Youngstown

being a basing point for this product; and that he never heard of any basing points for sheets other than those listed in schedule F of the code.

Pan-Atlantic Files New All-Water Tariff

WASHINGTON, April 24.—Effective today, the Pan-Atlantic Line has filed a tariff with the Shipping Board carrying proportional commodity all-water rates on iron and steel products of all kinds from shipside, Philadelphia, to New Orleans. The tariff applies only on shipments originating at points in the interior and only when moving to Philadelphia by rail.

Proportional rates from Philadelphia to New Orleans vary according to the points of origin. Apparently they are determined by taking the difference between joint through rates published by the Atlantic Freight Bureau lines from the same interior points to New Orleans and the rail locals from origin points to Philadelphia. The remainders, possibly something lower, are published as the Pan-Atlantic's proportional rates. The origin points lie as far west as Youngstown, Ohio, and other Ohio points along the Ohio river. They include steel mill points in Pennsylvania, New York, West Virginia, Bridgeport, Conn., Richmond, Va., Roebing, Burlington and Newark, N. J.; Cumberland, Md., Wilmington, Del., and numerous other producing points.

The tariff was not filed with the Interstate Commerce Commission but contemplates that shipments entitled to the proportional rates shall originate at the interior points which are listed. The rates include tollage at New Orleans, with various terminal absorptions and other advantages.

Examples of the water rates per 100-lb. applying from Philadelphia to New Orleans, follow:

Youngstown, 27½c., except on pipe and fittings, 20c. and 23c., when switched to tracks for delivery on Illinois Central, Louisville & Nashville, Louisiana & Arkansas, Texas & New Orleans, Public Belt, and Southern railroads; wire fencing, 22½c.

Pittsburgh general list, 27c.; pipe and fittings, 20c. and 24c., depending on delivery in New Orleans; wire fencing, 22c.

Bethlehem, Pa., structural shapes, 30½c.; general list, 32c.

The Rhode Island Strip Steel Co., Phillipsdale, R. I., has let general contract to H. M. Soule, 110 Brook Street, Pawtucket, R. I., for new one-story plant on Beveridge Hill Avenue, 30 x 120 ft., to cost about \$25,000 with equipment.

PWA To Get Additional Half Billion—Extra \$400,000,000 for Roads

WASHINGTON, April 24.—New projects representing an outlay of \$300,000,000 and continuing projects involving \$200,000,000 will be included in the new Public Works Administration program. The limit of \$500,000,000 is said to have been determined upon at a conference between President Roosevelt and Public Works Administrator Ickes last Thursday. The figure is much smaller than that proposed by Progressive members of the Senate but was adjusted to the President's budget, which provides for emergency expenditures of \$2,000,000,000 for the fiscal year beginning July 1. Efforts in the Senate to increase the amount in all probability will prove unavailing. It is the view of the administration that \$500,000,000 will be sufficient for new projects and to continue the larger projects for which only partial allotments were made out of the \$3,300,000,000 received by the PWA last year and all of which has been allotted.

At the conference also was Secretary Wallace, whose department is expected to again be appropriated \$400,000,000 for highway construction.

Home Construction Program

This conference was followed by one at which the President was given tentative plans for a large home construction and modernization program for which estimates as high as \$1,500,000,000 have been made. Frank C. Walker, chairman of the Executive Council, detailed the plans as developed to the President and said that further meetings would be necessary to work them into final form. So far as made public the plans are decidedly hazy. He said the idea is to stimulate private capital and that it had not been decided whether direct Government loans will be made. Others at the conference included Secretaries Morgenthau, Roper, Ickes and Wallace, General Hugh S. Johnson, Harry L. Hopkins, relief administrator, and Jesse Jones, chairman of the RFC.

\$150,000,000 For Industry

Report is expected to be made this week of a bill from the Senate Banking and Currency Committee providing \$300,000,000 for industry loans, the Treasury to supply \$150,000,000 and the Federal Reserve banks an equal amount. The proposed legislation was endorsed by President Roosevelt at a White House conference last Friday with Senator Glass of Virginia, its sponsor, and Governor Eugene Black of the Federal Reserve Board. The plan calls for advancing loans up to five years by the Federal

Reserve banks or through other banks to commercial institutions, the Treasury to take over the holdings in the Federal Deposit Insurance Corp. Reserve banks would be authorized to discount for, or purchase from, any bank, mortgage company, credit corporation for industry, or other financing institution obligations having maturities not exceeding five years.

The aggregate amount of industrial loans reserve banks may have outstanding at one time shall not exceed the combined surplus of the banks as of July 1, 1934, which, it is estimated, will be between \$140,000,000 and \$150,000,000. During the interim the Treasury would be authorized to make an outright grant of \$150,000,000 to the Reserve banks from the \$2,600,000,000 profit supposed to have been realized when the gold dollar was devalued.

Meanwhile a new turn is being made in the PWA. A growing number of applicants, chiefly municipalities, have notified Mr. Ickes that they have reconsidered and will not build projects for which loans had been asked. Also, instead of accepting loans for which allotments had been made, some have asked only for the 30 per cent grant available to non-federal political units. In both instances the money released has been reallocated to other projects which were left on the waiting list when the \$3,300,000,000 appropriation was exhausted.

Code Eagle To Appear May 1

WASHINGTON, April 24.—The Code Eagle will perch over industry May 1. Official announcement to this effect has been made by General Johnson, who has explained that the familiar legend, "We Do Our Part," will be replaced by the single word, "Code," under which will appear the name of the trade or industry to which the employer belongs and his individual registration number. Accompanying the administration's letter to employers is a simple application card, addressed for return to State NRA compliance directors and an instruction sheet outlining the procedure to obtain the individual eagle. The trucking industry is among a class to which the new insignia will be delivered by State compliance directors. Eagles for other industries and trades will be distributed by their respective code authorities to whom State directors will forward employers' applications.

The NRA has approved a number of amendments to the code for the

boiler manufacturing industry. The amendments provide for uniform cost accounting systems, forbid selling below cost and require open price lists. Operation of the provision for a waiting period between the filing and effective dates of price lists was stayed for 60 days.

Public hearing on the proposed code of fair competition for the architectural, ornamental and miscellaneous iron, bronze wire and metal specialties manufacturing industry will be held by Deputy Administrator L. S. Horner at the Mayflower Hotel on May 8. The code is supplemental to the fabricated metal products manufacturing, metal finishing and metal coating industry's code, and adopts the wage, hour and labor provisions of the basic code.

Public hearing on the proposed code of fair competition for the wire reinforcement industry will be held by Deputy Administrator C. L. Hickling in room 2062 of the Commerce Building on May 1. The code, sponsored by the Wire Reinforcement Association, provides for a 40-hr. week, averaged over any six-month period, with a limitation of no more than 48 hr. in any one week.

March Employment Highest Since 1930

FACTORY employment and pay rolls continued to expand in March, employment increasing 4 per cent over the month interval and pay rolls increasing 6.9 per cent, according to the Bureau of Labor Statistics. The bureau's index of factory employment in March, 1934, at 80.8, reached the highest point recorded since December, 1930, and the index of factory pay rolls, 64.8, is the highest recorded since August, 1931. Increases in employment between February and March have been shown in 12 of the preceding 15 years for which data are available. An increase in employment therefore at this time is not unexpected but in no previous year has the March gain been as pronounced as the increase registered this year. Pay rolls also normally increase in March as compared with February. Only in 1920, however, has the March increase in pay rolls exceeded the gain shown in the current report.

The results of an investigation of the scaling of steel that was sponsored by a committee of the American Gas Association are available in pamphlet form in bulletin No. 25 of the Department of Engineering Research, University of Michigan, Ann Arbor, Mich. Both carbon and alloy steels were subjected to different combustion atmospheres obtained by burning manufactured gas under different gas-air ratios.

Scrap Exports To Japan Get International Attention

WASHINGTON, April 24. — American exports of iron and steel scrap to Japan are influencing international affairs. The recent Japanese memorandum protesting American aviation exports to China called attention to alleged imports of "war materials" by Japan. The excitement over these importations, disposition of which obviously is not known, is also tied in with the "study" a special committee of the Senate is to make regarding the "whole question of international traffic in arms and munitions" together with "secondary materials which may be utilized for war materials." The term "war materials" never has been clearly defined and perhaps never will be. It is so broad the task of definition would be difficult; while cotton certainly is a war material it is assumed that, being an agricultural product, it will not be dragged into that category. Nor does it lend the political capital that can be made out of harping on war materials that may be made out of iron and steel, scrap, etc.

Exports of scrap to Japan from the United States in 1933 totaled 547,539 gross tons, rising from 164,001 tons in 1932. Obviously the reason for importing scrap is that it can be done more cheaply than iron ore. Japan's ore imports are sizable, and it goes as far as the Malay States to get 1,000,000 tons of iron ore a year. Likewise ore is imported from Korea.

These movements have grown since China, Japan's chief source of supply in former years, has been cut off by internal dissensions. Manchuria also has great quantities of iron ore, but it is of a low grade, making it uneconomical to ship it to and smelt it in Japan proper. Instead the pig iron is made in Manchuria and shipped into Japan. Some of this pig iron came to the United States within the past year. It was generally found to be of an inferior grade and unsuitable to foundry practice in the United States.

Exports of scrap to Japan include both No. 1 and No. 2 heavy melting steel, tin plate scrap, and miscellaneous grades of other kinds; and while some of it may have gone into munitions manufacture, undoubtedly some of it is used for commercial steel production. According to *The Iron and Steel Fortnightly*, published by the iron and steel division, Department of Commerce, Japanese steel ingot production in the first 11 months of 1933 totaled 2,795,000 metric tons, increasing 35 per cent from the 2,094,000 tons made in 1932. The gain was due both to military replenishment

and increase in general commercial activity. That Japan uses great quantities of scrap, which she receives from numerous countries, is indicated by the pig iron production of only 1,842,000 tons in the first 11 months of 1933.

The scrap movement from the United States may develop a policy in the Department of Commerce of selling ships at scrap prices. There are some 250 to 300 ships awaiting

disposal, and Congress has been called upon to determine whether they should be allowed to lie idle awaiting higher bids for them as seaworthy vessels or to let them go at scrap prices.

There is also a view developing that while general exports of scrap from the United States are to be encouraged rather than discouraged, restrictions should be placed on the outgoing movement of tin plate scrap unless it has been first detinned. There has also been criticism of exporting armor plate scrap because of its chrome-nickel alloy. Although nickel is readily available from Canada, under emergency conditions tin would not be so easily accessible.

Weirton Company Files Affidavits Disproving Coercion

WILMINGTON, DEL., April 23.—The Weirton Steel Co. filed 819 affidavits, signed by more than 1000 persons, in the United States District Court here this morning in reply to Government affidavits filed recently, asking for a preliminary injunction.

A hearing will be held before Judge John P. Nields on Monday, April 30, for argument on the injunction through which the Government seeks to have the steel company provide payroll lists and other documents necessary to a new election to determine representatives of its employees, and to restrain the company from preventing an election.

In general, the steel company's affidavits assert that there was no coercion, restraint or intimidation of voters in the election of Dec. 15, 1933, as is alleged in statements entered by the Government; that the present plan of employee representation is functioning to the satisfaction of the large majority of the workers; that peaceful labor conditions now exist, and that, for these reasons, there is no need for a preliminary injunction.

Charges that approximately 60 persons whose names are signed to Government affidavits deny that they signed the documents, and that 104 persons who signed Government affidavits as employees of the Weirton Steel Co. were not employees at all are contained in the company's affidavits.

Persons who made affidavits presented by the company, and also signed Government affidavits, allege that their signatures to the Government documents were obtained in pool rooms, on street corners and in meetings, and that it was represented to them that they were signing unsworn petitions in favor of the Amalgamated

Union, and were not told they were affidavits for use in a law suit.

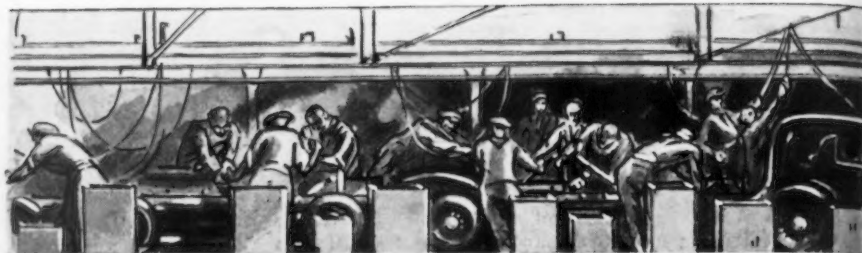
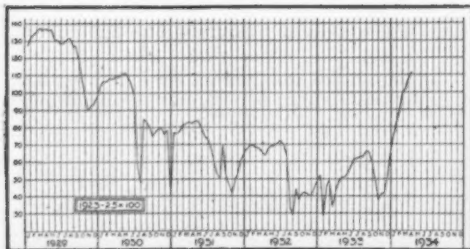
A number of these persons whose names are on Government affidavits, asserting that they were driven to the polls by police with riot clubs, retract their statements in the affidavits filed today. In one instance, a Government affidavit charges that a man was injured in being forced to vote. This man has filed an affidavit, supported by several other affidavits, that his injury was an accident.

According to Weirton company affidavits, three agents of the United States Department of Justice, H. A. Bangert, J. C. Rider, and F. M. Ames, as well as newspaper reporters and newsreel men, were in the mills throughout the election and reported no disturbance, disorder, coercion, or intimidation.

Signers of Weirton company affidavits include 47 of the 49 employees representatives elected in December, as well as approximately 150 disinterested employees who served as election officers at the 32 polling places in the plants. These affidavits state there was no compulsion or coercion of any kind, and that of 11,443 eligible voters, ballots were cast by 9,336.

Pointing out that the present method of employee representation is an effective means of collective bargaining, many statements assert that there is now no labor disturbance in the plants of the Weirton company, that they are operating at 94 per cent of capacity, and that the Government's suit was instigated by a small group of labor agitators.

The company also filed affidavits from ministers, business men and others in the communities in which its plants are located, testifying that peaceful labor conditions now exist.



THIS WEEK ON THE

Prospective Equipment Orders Loom Large as 1935 Plans Take Form

DETROIT, April 24.

WHILE the automobile industry continues to radiate confidence, with production being maintained around 400,000 units a month, plans for 1935 cars are assuming more definite form. They constitute good news for the machine tool and heavy equipment industries, as the changes contemplated call for large expenditures for machinery.

Some of this business is so near at hand that it should result in substantial orders within the next 60 days. The largest tooling program in immediate prospect is for next year's Buick models. This program is proclaimed as one of the biggest in Buick's history. It is understood that it would have got under way by this time had it not been for the present tool and die strike. Despite the fact that much tool and die work can be allotted to shops outside the State of Michigan, it is said to be impractical to go through with an automotive tooling program without having at least some of the work done in Detroit.

This city has shops especially equipped to handle automotive business which are almost next door to the automobile factories. Thus engineering changes can be effected with the least delay and confusion, whereas if the work was being done in far-distant cities the matter of communication and personal supervision on the part of car manufacturers would be difficult. This explains the reluctance of Buick officials to proceed with their tooling program until the strike is cleared up. It is believed that within another week or 10 days conditions in the local tool and die trade will have returned to normal.

Pontiac To Buy Equipment

Aside from Buick, the most promising equipment buying is likely to center at the Pontiac Motor Co., which is reported well along on the development of a six-cylinder car to supplement its straight eight in 1935.

Detroit Employment Highest Since May, 1930

INDUSTRIAL employment in Detroit, as shown in the accompanying chart, now stands at the highest level since May, 1930, according to the industrial department of Detroit Board of Commerce. The increase over a year ago is 134 per cent. Taking the average employment during the years 1923 to 1925 as 100, the employment index reached 111.2 April 15, compared with 101.8 March 15 and 107.7 at the end of March. April 15, 1933, the index stood at 47.5.

It is not yet known to what extent equipment purchases will be made, but it would not be surprising if the total topped half a million dollars. It is said that machine tools probably will have to be bought for the cylinder block, crankshaft and camshaft lines as well as for other engine parts. Initial orders probably will be placed in the next two weeks.

Later in the year, probably about July, considerable machine tool buying will be done by various divisions of Chrysler Corp. Packard, with a \$1,200 car for next year officially announced in a letter to stockholders recently, is expected to have to purchase some equipment for this job. Even Ford, desiring to strengthen weak spots in its production lines at Rouge, is reported to be considering expenditures for individual machines during the next month or two.

A high official in a leading motor car factory privately stated his opinion the past week that it will be only a matter of months until equipment builders will have so much work on hand that Detroit buyers will be shopping around trying to find suitable places to have necessary machinery made. Although this may be an over-optimistic view, it is indicative of the conviction throughout the Detroit district that changes for 1935 cars

will involve the greatest capital outlay for machine tools in several years.

Stamping Machinery Ordered

Taking a lesson from their experiences with 1934 models, car makers are not going to be caught napping in the preparation of next year's lines. They will start early; in fact, they already have contracted for stamping equipment which will take four or five months to build.

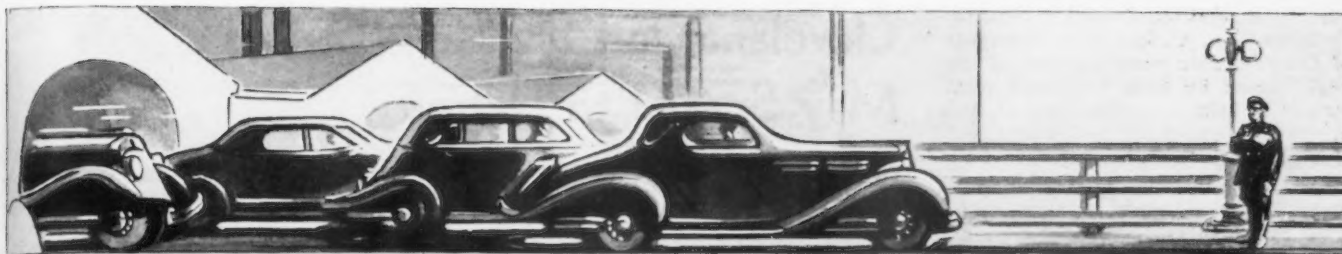
How extensive mechanical changes will be in 1935 cars is yet wrapped in a veil of secrecy. At least one or two companies will venture forth with rear-engine cars, but this experiment will not be tried by manufacturers which can be considered as in "quantity production."

While Chrysler has pointed the way in streamlining, it has taken a stand against rear-end engine mounting, if the opinion of Carl Breer, Chrysler executive engineer, is representative of the corporation's thinking. Mr. Breer states that the transfer of the engine to the rear creates serious problems in front-end stability. When the entire engine overhangs the rear axle the front wheel load is reduced in greater proportion than the turning resistance, resulting in a loss of adhesion between the front tires and the road and an increased tendency for the front wheels to skid.

Opposes Rear-Engine Cars

Mr. Breer emphasizes the danger in case of a collision involving a rear-engine car. There would be less material upon which the impact might spend itself, and the terrific inertia accompanying the sudden stopping would tend to force the engine into the passenger compartment. "The passengers," he declares, "would be as out of place as a finger between a hammer and a nail." His solution for the problem of proper weight distribution in an automobile is to shift the engine forward over the front axle, as has been done in the Airflow Chrysler and De Soto models, instead of moving it to the rear.

Directly contrary views are expressed by William B. Stout, former associate of Henry Ford, who shortly will introduce a rear-engine car. He contends that the rear-engine car



ASSEMBLY LINE

gives much more room for passengers than present models, has better road traction, and will skid less. It likewise cuts down gasoline consumption at high speeds.

Mr. Stout, long a leader in aviation design, is expected to follow closely the principles used in the aircraft industry in the construction of his new rear-engine car. He will particularly make use of light alloy metals, claiming that the car will be 1000 lb. lighter than present models without sacrificing strength or stability on the road.

Radical Streamlining To Be Pushed

Entirely apart from the merits and handicaps of rear-engine mounting, the tendency toward radical streamlining will be given a big forward push in 1935. Although manufacturers generally probably will alter or modify considerably the body design as illustrated in the Chrysler and De Soto Airflow cars, the Airflow principle is likely to have a lasting effect on the entire industry.

Usually moving with caution, General Motors this year showed signs of abandoning its traditional conservatism by putting knee-action wheels on its complete line of cars, with the exception of the standard Chevrolet. However, in body design it continued to lean toward the conservative side. There are growing signs that in 1935 models this cloak of caution will be cast aside and all divisions may commit themselves to streamlined design.

While plans still are in the formative stage, General Motors is understood to be working on designs which are a modification of the Airflow lines, especially in relation to the front end of the car. It is likely that the sweeping rear-end effect will be adopted without compromise. It is no exaggeration to say that the appearance of General Motors cars in 1935, according to reliable reports, is likely to be more drastically changed than in years.

The use of unusually large sheet blanks, either in one piece or perhaps stitch-welded together, is assured by plans of one automobile manufacturer. It has designed press equipment for next year to handle material 100 x

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

170 in. It is not believed that any sheet mill has taken steps to make sheets 100 in. wide, or even 90 in. Unless some steel maker is willing to gamble on the investment in equipment necessary to turn out such wide sheets, automobile companies will have no other course than to stitch-weld two sheets for the stamping operation.

Two motor car manufacturers are contemplating the installation of equipment which restores highly-specialized, mass-production, single-purpose, automatic machines to the top of the list of desirable purchases. One company, for example, is considering the replacement of existing equipment on a certain job with a machine which is automatic from start to finish and which holds the work to closer tolerances than ever before attempted for that particular part.

High-Production Tools Favored

Mounting labor costs, the pressure on production departments to cut down manufacturing expense to the lowest possible point on every item, and recent troubles with organized labor led by agitators are the more important factors working in behalf of further installations of automatic, single-purpose equipment. The automobile industry, generally speaking, has not departed from its rigid policy of buying no machinery unless it pays for itself within one year, or during the life of a model. In some cases companies insist that a large percentage of the cost be returned in the form of savings in the first three months. Expansion of the automotive market as the country gradually swings out of the depression, bringing with it higher volume of production, is another potent factor contributing toward increased purchases of automatic, high-production tools.

Steel releases for immediate rolling, particularly in the heavier products, have not been so large as mills had anticipated. Sheet and strip steel makers, of course, have enjoyed heavy

specifications, but even in flat-rolled items the capacity of some companies is far from being fully engaged, despite tremendous tonnages named in second quarter contracts.

Steel mills doing business with the Ford Motor Co. made futile attempts the past week to get Ford to sign contracts for coverage throughout the current quarter. Ford, however, placed substantial orders for material to be rolled by June 30. Thus it secured protection at old prices without retreating one step from its position against the making of formal contracts. It is generally conceded in the local steel trade that purchases by automobile companies at old prices will give them enough tonnage in most cases to carry them through the remainder of the production runs on current models.

Ford at 5000 a Day

Automobile companies continue at the peak volume for the year. Ford's output is at or near 5000 units a day, with the likelihood that assemblies this month will exceed 100,000 units. Chevrolet likewise is making about 5000 cars a day. Its total for the month probably will be 120,000 to 127,000 units. In the week ended April 14 Plymouth produced 9646 cars.

Oldsmobile is maintaining operations at 900 units a day, by far the highest level of the year. In addition to making its six and eight, Olds is understood to be turning out some parts for General Motors Truck Corp. During the first 10 days of April, Buick delivered to customers 2853 cars; since Jan. 1 it has sold at retail 14,840 cars, as against 11,069 in the same period of last year. Buick dealers in 157 cities sold more cars in the first quarter than in all of 1933.

In the year to date, Dodge dealers have delivered 26,687 passenger cars and 11,626 trucks. Chrysler and De Soto Airflow production is still gaining, but dealers are unable yet to get all the cars they want.

Detroit Notes

Ford is reported to be investigating the possibilities of producing a car in France. It is said that plans might take the form of a working arrange-

ment with Mathis, French car manufacturer. . . . Orders and shipments of Chrysler cars since the first of the year exceed by 5000 units the total output in 1933. . . . The first of Auburn's new two-door six-cylinder and straight eight brougham models came off the line last week. . . . Graham has announced a standard straight eight with supercharger as regular equipment. . . . The employment index of the Detroit Board of Commerce on April 15 stood at 111.2, compared with 107.7 on March 31 and 47.5 on April 15 a year ago.

Labor Statistics Bureau Revises Index Numbers

THE Bureau of Labor Statistics of the Department of Labor has revised its index numbers of factory employment and payrolls from January, 1919, to March, 1934. Hereafter the bureau's index will be based on the three-year average, 1923-24-25, as 100, as recommended by the advisory committee to the Secretary of Labor.

Two radical changes have been made in the index. First, the index for each of the 90 separate industries surveyed each month has been adjusted to conform with the figures on employment and payrolls for previous years as published by the Bureau of the Census. Similar adjustments have been made for the 14 groups into which these industries are classified, and for the general index for all manufacturing industries. This change has been made so that the indexes may reflect as accurately as possible the changes in total factory employment and payrolls, not only from month to month, but also over a period of years.

A second change in the revised series of index numbers is the shifting of the base from the 12-month average for 1926 to the average for the three-year period, 1923-24-25. This broader base was selected as preferable to the single-year base, not only because it minimizes any unusual condition which would greatly affect the relative position of any industry in any single year, but also to place the bureau's indexes on a base similar to a number of other official and private series of indexes on employment, payrolls and production.

Data for the non-manufacturing industries are also being revised and improved by the bureau. More than 100,000 additional firms in the field of wholesale and retail trade, real estate, building construction, dry cleaning and laundries, have recently been added to the roll of establishments reporting to the bureau.

Sales billed by the General Electric Co. in the first quarter amounted to \$34,936,000, compared with \$26,101,000 for the same 1933 quarter, an increase of 35 per cent.

Cleveland and St. Louis Strikes May Spread to Detroit

THE strike of employees of the Cleveland plant of Fisher Body Corp., which was called suddenly Monday morning, was the result of a breakdown of negotiations between the management and the A. F. of L. committee which had presented a list of demands at several meetings in the last week. The A. F. of L. representatives are said to have felt that negotiations were leading nowhere, inasmuch as the management flatly refused the demands which included union recognition, a 30 per cent increase in wages, time and a half for overtime, and double time on Sundays. The strike has been effective in tying up the plant and meanwhile the company has asked for immediate suspension of steel shipments. It is believed that if the strike continues more than a few days it will force the closing not only of Chevrolet branch assembly plants but also Pontiac and Oldsmobile divisions of General Motors Corp. The Cleveland plant of Fisher Body makes body stampings for all three of these General Motors Divisions. A shortage of bodies had slowed down Pontiac assemblies before the Cleveland strike was declared and this in turn had been reflected in hold-ups of steel for Pontiac.

Unless a settlement is effected at Cleveland in short order, it is considered probable that the strike will spread to other General Motors units in the Detroit district. The Cleveland situation, therefore, is looked upon as a tinder box which has the potentialities for spreading a strike conflagration throughout the industry. For the present the matter of adjusting the difficulties are in the hands of the Automobile Labor Board headed by Dr. Leo Wolman.

Concurrent with the Cleveland strike is a strike at the Chevrolet branch assembly plant and the Fisher Body plant adjoining it in St. Louis. The strike action there was taken by the Federated Automobile Workers of America, which recently broke away from the American Federation of Labor and set up its own union. The trouble grows out of failure to settle satisfactorily cases of alleged discrimination against union employees. Late last week the Automobile Labor Board issued a statement about the discriminatory cases at St. Louis, pointing out that from a total of over 200 more than 100 are back at work or soon will be reemployed, and the management has promised prompt reports on the remainder.

The tool and die strike still is in progress, although there has been little picketing, and news of it no longer makes the front page of local papers. Some tool and die shops un-

officially have gone on record as stating that they do not intend to deal further with the Mechanics Educational Society, and so far as they are concerned the strike is over. An accurate check of local shops shows that men are returning to work daily and the strike is destined to fail.

Arnold W. Scott, former representative of the Pontiac members of the Mechanics Educational Society until his suspension from the society last week, charges that Matthew Smith, general secretary, and a noisy minority are in control of the organization, and that "they do not want good times but unrest, industrial disturbances and dissatisfaction so that automotive workers can be more easily organized."

Demand For Investment Capital Accumulating

AN accumulated demand for new investment capital totaling \$4.5 billion for producing and operating facilities has piled up in the last three years as a result of the virtual cessation of private financing, according to estimates of the National Industrial Conference Board. In the same period, Federal financing has siphoned \$4.5 billion from the capital market.

"Capital borrowed by the Federal Government in recent years and directed into non-productive channels," says the board, "has been barely equal to the total that might have been absorbed in extending the nation's producing and operating facilities alone."

From the all-time peak of \$9.4 billion in 1929, the total of new capital and refunding issues for domestic corporations floated in the American investment market dropped to \$380 million in 1933. Of the 1933 total, only \$161 million went into new capital issues, the balance being absorbed by refundings. New capital invested in a single month in any of the years from 1924 to 1929 was in excess of the value of new issues floated during the entire 12 months of 1933. Moreover, of the \$161 million of new capital issues in 1933, \$83 million was taken by the liquor and allied industries, revived by the repeal of prohibition. Thus, less than \$80 million was available for the extension of industrial and commercial enterprise in all other fields of activity.

Weirton Steel Co. and Hanna Furnace Corp. have moved their New York offices to 500 Fifth Avenue.

SUMMARY OF THIS WEEK'S BUSINESS

Consumer Pressure for Materials Drives Output Up to 56 Per Cent

Further Gains in Production Are Indicated Unless Labor Disturbances Grow More Serious—Scrap Weakens

THE rapidly growing influx of specifications against low-priced contracts has boosted steel production four points to 56 per cent of capacity, and another week promises to put the rate above the 1933 peak of 59 per cent reached last July. In some steel products mills have such heavy commitments that they fear they will not be able to clear their books by the end of the quarter, as required by the code. Recognizing the possibility of excessive pressure on the mills for shipments in June, an increasing number of consumers are anticipating their requirements. In other cases mills are rolling material prior to the receipt of actual shipping orders.

The rush to accumulate tonnage on the part of consumers is, no doubt, prompted in part by speculative motives. Besides the impetus that buying has received from recent price advances, the fear of railroad labor trouble and consequent hampering of transportation has also been a factor.

The accelerating movement of material from producers to consumers has been sweeping in scope. May and June shipments of pig iron will be the largest in fully two years.

THE only developments out of step with the pronounced upward trend of business are a fresh outbreak of labor trouble in the automobile industry and further weakness in scrap prices. With motor car production well established at a rate of 400,000 units a month, a strike at the Cleveland plant of the Fisher Body Corp. called Monday and a tie-up of two General Motors' branch plants at St. Louis have introduced a new element of uncertainty into the outlook. The Fisher plant at Cleveland has already cut off steel shipments, and a continued suspension of its operations would seriously affect the production of Chevrolet branch assembly plants, as well as the Pontiac and Oldsmobile divisions of General Motors.

Scrap prices have shown an easy tone ever since the second week of March, when THE IRON AGE composite for heavy melting steel, at \$13 a ton, reached its peak to date this year. Recessions in prices at Pittsburgh and Philadelphia have driven down the composite from \$12.58 a ton a week ago to \$12.42 a

ton. A marked increase in the supply of scrap with the coming of spring weather, rather than any reduction in consumption, apparently accounts for the downward movement of the market.

MOST of the price advances announced recently are now in effect on spot business. While some producers have lagged in filing advances, the code does not require them to wait 10 days before making their new prices effective. While pig iron makers are rather uniformly giving their customers the benefit of the 10-day waiting period, this is not so true of finished steel, and with few exceptions the recently announced advances on steel products are being generally quoted. Among later advances not yet fully in effect are increases of \$3 a ton on billet reinforcing bars and \$6 to \$8 a ton on electrical sheets. Jackson County silvery iron will be advanced 60c. a ton, effective May 3.

Advances now in force have raised THE IRON AGE composite for finished steel from 2.028c. to 2.222c. a lb., which is \$1.50 a ton below the average for 1929 and \$3.74 a ton below that of the popular index base year 1926. The pig iron composite has advanced from \$16.90 per gross ton to \$17.57, or 86c. a ton below the average of 1929 and \$2.85 per ton below that of 1926.

THE desire to take advantage of former prices expedited action on numerous construction projects, both public and private. Structural steel awards for the week, at 21,400 tons, compare with 13,650 tons a week ago. New projects, at 49,100 tons, are the largest since last August.

Gains in steel output during the week were marked in a number of producing centers. Operations have risen five points at Pittsburgh to 45 per cent, five points at Chicago to 59 per cent, two points in the Philadelphia district to 42 per cent, one point in the Valleys to 60 per cent, nine points at Cleveland to 69 per cent, three points at Buffalo to 62 per cent, two points in the Wheeling district to 72 per cent and four points in the South to 58 per cent. The Detroit rate remains at 100 per cent of capacity.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:

	Apr. 24, 1934	Apr. 17, 1934	Mar. 27, 1934	Apr. 25, 1933
No. 2 fdy., Philadelphia.....	\$20.26	\$19.26	\$19.26	\$14.34
No. 2, Valley furnace.....	18.50	17.50	17.50	14.50
No. 2 Southern, Cin'tl.....	18.13	18.13	18.13	15.82
No. 2, Birmingham.....	13.50	13.50	13.50	12.00
No. 2 foundry, Chicago*.....	18.50	17.50	17.50	15.50
Basic, del'd eastern Pa.....	19.76	18.76	18.76	14.09
Basic, Valley furnace.....	18.00	17.00	17.00	13.50
Valley Bessemer, del'd P'gh.....	20.76	19.76	19.76	16.89
Malleable, Chicago*.....	18.50	17.50	17.50	15.50
Malleable, Valley.....	18.50	17.50	17.50	14.50
L. S. charcoal, Chicago.....	24.04	24.04	23.54	23.17
Ferromanganese, seab'd car-lots	85.00	85.00	85.00	68.00

*This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:

Rails, heavy, at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$40.00
Light rails, Pittsburgh.....	35.00	32.00	32.00	30.00
Rerolling billets, Pittsburgh.....	29.00	26.00	26.00	26.00
Sheet bars, Pittsburgh.....	30.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	29.00	26.00	26.00	26.00
Forging billets, Pittsburgh.....	34.00	31.00	31.00	31.00
Wire rods, Pittsburgh.....	38.00	36.00	36.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.70	1.60	1.60	1.60

Finished Steel

Per Lb.:

	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.90	1.75	1.75	1.60
Bars, Chicago.....	1.95	1.80	1.80	1.70
Bars, Cleveland.....	1.95	1.80	1.80	1.65
Bars, New York.....	2.23	2.08	2.08	1.95
Plates, Pittsburgh.....	1.85	1.70	1.70	1.50
Plates, Chicago.....	1.90	1.75	1.75	1.70
Plates, New York.....	2.13	1.98	1.98	1.598
Structural shapes, Pittsburgh.....	1.85	1.70	1.70	1.60
Structural shapes, Chicago.....	1.90	1.75	1.75	1.70
Structural shapes, New York.....	2.10 1/4	1.95 1/4	1.95 1/4	1.86775
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	1.70
Hot-rolled strips, P'gh.....	2.00	1.75	1.75	1.45
Cold-rolled strips, P'gh.....	2.80	2.40	2.40	1.80

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Finished Steel

Per Lb.:

	Apr. 24, 1934	Apr. 17, 1934	Mar. 27, 1934	Apr. 25, 1933
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.65	2.25	2.25	2.00
Hot-rolled annealed sheets, No. 24, Gary.....	2.75	2.35	2.35	2.10
Sheets, galv., No. 24, P'gh.....	3.25	2.85	2.85	2.70
Sheets, galv., No. 24 Gary.....	3.35	2.95	2.95	2.80
Hot-rolled sheets, No. 10, P'gh.....	2.00	1.75	1.75	1.40
Hot-rolled sheets, No. 10, Gary.....	2.10	1.85	1.85	1.50
Wire nails, Pittsburgh.....	2.00	2.35	2.35	1.85
Wire nails, Chicago dist. mill.....	2.05	2.40	2.40	1.90
Plain wire, Pittsburgh.....	2.30	2.20	2.20	2.10
Plain wire, Chicago dist. mill.....	2.35	2.25	2.25	2.15
Barbed wire, galv., P'gh.....	3.00	2.85	2.85	2.35
Barbed wire, galv., Chicago dist. mill.....	3.05	2.90	2.90	2.40
Tin plate, 100 lb. box, P'gh.....	\$5.25	\$5.25	\$5.25	\$4.25

Scrap

Per Gross Ton:

Heavy melting steel, P'gh.....	\$14.00	\$14.25	\$14.25	\$10.50
Heavy melting steel, Phila.....	11.50	11.75	11.75	8.25
Heavy melting steel, Ch'go.....	11.75	11.75	12.00	7.75
Carwheels, Chicago.....	11.75	11.75	11.75	8.25
Carwheels, Philadelphia.....	13.00	13.00	13.00	9.00
No. 1 cast, Pittsburgh.....	13.75	13.75	13.75	9.50
No. 1 cast, Philadelphia.....	13.00	13.25	13.25	8.00
No. 1 cast, Ch'go (net ton).....	9.50	9.50	9.50	8.00
No. 1 RR. wrot., Phila.....	12.50	12.50	11.00	8.00
No. 1 RR. wrot., Ch'go (net).....	9.50	9.50	9.50	6.00

Coke, Connellsville

Per Net Ton at Oven:

Furnace coke, prompt.....	\$3.85	\$3.85	\$3.50	\$1.75
Foundry coke, prompt.....	4.60	4.60	4.25	2.50

Metals

Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Electrolytic copper, refinery.....	8.25	8.25	7.75	6.00
Lake copper, New York.....	8.50	8.50	8.00	6.25
Tin (Straits), New York.....	55.90	55.50	54.45	30.25
Zinc, East St. Louis.....	4.37 1/2	4.40	4.32 1/2	3.70
Zinc, New York.....	4.72 1/2	4.75	4.67 1/2	4.07
Lead, St. Louis.....	4.10	4.10	3.90	3.37 1/2
Lead, New York.....	4.25	4.25	4.00	3.50
Antimony (Asiatic), N. Y.....	7.95	7.95	7.60	6.12 1/2

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

April 24, 1934
One week ago
One month ago
One year ago

2.028c. a Lb.
2.028c.
2.028c.
1.867

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1934.....	2.222c., April 24;	2.028c., Jan. 2
1933.....	2.036c., Oct. 3;	1.867c., Apr. 18
1932.....	1.977c., Oct. 4;	1.926c., Feb. 2
1931.....	2.037c., Jan. 13;	1.945c., Dec. 29
1930.....	2.273c., Jan. 7;	2.018c., Dec. 9
1929.....	2.317c., April 2;	2.273c., Oct. 29
1928.....	2.286c., Dec. 11;	2.217c., July 17
1927.....	2.402c., Jan. 4;	2.212c., Nov. 1

Pig Iron

\$17.57 a Gross Ton
16.90
16.90
14.01

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
\$17.57, April 24;	\$16.90, Jan. 27	
16.90, Dec. 5;	13.56, Jan. 3	
14.81, Jan. 5;	13.56, Dec. 6	
15.90, Jan. 6;	14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	

Steel Scrap

\$12.42 a Gross Ton
12.58
12.67
8.83

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
\$13.00, Mar. 13;	\$11.33, Jan. 2	
12.25, Aug. 8;	6.75, Jan. 3	
8.50, Jan. 12;	6.42, July 5	
11.33, Jan. 6;	8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25, Jan. 11;	13.08, Nov. 22	

Pittsburgh Operations Go Up Five Points



Rate Is Now 45 Per Cent, the Highest Since Last August — Output Headed for Higher Levels — Scrap Weakens

PITTSBURGH, April 24.—Raw steel output in the Pittsburgh district this week has jumped five points to 45 per cent, the highest level reached since the week of Aug. 16, 1933. In the Valleys production is up slightly at 60 per cent, and in the Wheeling district output has increased two points to 72 per cent. The increased open-hearth activity is considered encouraging in the absence of any remarkable expansion in specifications against second quarter contracts. Consequently the outlook for further increases in ingot output during the quarter is considered very favorable. Specifications will doubtless become more urgent as the quarter progresses. Already some releases specify immediate shipment, thus placing early stress upon producers whose rolling schedules will have to be carefully planned if the heavy commitments for the quarter are to be fulfilled under code provisions. One of the chief problems confronting producers this quarter concerns the highly special character of some steel specifications. In some cases consumers are anticipating their forward needs in order to cooperate with mills in planning second quarter production.

At the close of the current week all price advances previously filed will have become established. The only important steel products that have thus far not been marked up are standard steel rails, track supplies and tin plate.

The advances on pipe have not driven in as much anticipatory tonnage as that realized by other products, and pipe mills still are behind most finishing mills. Sheet mills and strip mills have not thus far been forced to accelerate their schedules noticeably, although rolling will probably be considerably speeded up next month. Wire mills are slightly busier. Although tin plate specifications are tapering, mills in this group will probably maintain the present 80 per cent operating rate for several weeks.

The scrap market is weak, with No. 1 heavy melting steel at Pittsburgh off 25c. a ton.

Pig Iron

With higher second quarter prices

now established at Neville Island, Sharpsville and Youngstown, contracting has dwindled. Shipping releases against contracts committed at lower prices are fairly brisk. Although foundry melt in this district is beginning to expand, it is not likely that stocks will need further replenishment until well toward the close of the quarter. Non-integrated steel mills, though only moderately covered ahead, display little or no interest in the current market.

Semi-Finished Steel

Producers in this district are now adhering to the new prices for second quarter. Practically all important non-integrated mills, however, contracted at the old prices, and little new buying is reported. Shipments are being taken rapidly, with sheet bars particularly in demand for tin plate mills and sheet mills. Wire rods are also in better demand.

Bolts, Nuts and Rivets

Large rivets are now uniformly established at \$3, base per 100 lb., Pittsburgh or Cleveland, and the discount on small rivets at 70 and 5 per cent off list at Pittsburgh, Cleveland, Chicago and Birmingham. Bolts and nuts will not be advanced during second quarter, but will likely be marked up for third quarter. Most consumers are specifying generously against second quarter contracts, with demand well spread. Considerable prospective tonnage is in sight for the Navy construction program.

Bars

Specifications against second quarter contracts entered at 1.75c., Pittsburgh, are exceptionally heavy. In fact, some consumers have recognized the possibilities of delays in mill shipments in June and are anticipating their requirements. An encouraging feature is that demand is not top-heavy from any particular source, but is very widespread. The new price of 1.90c. has not thus far attracted much spot tonnage.

On April 27 billet steel reinforcing, in cut lengths as quoted by distributors, will be uniformly quotable at 2.05c., Pittsburgh. The prospective advance has not driven in much busi-

ness, and new specifications are rather restricted. Inquiries for a few projects in connection with the large sewage job in and near Columbus, Ohio, are now in circulation. Road construction in Pennsylvania is lending very little support.

Warehouse Business

Prices will be generally advanced on April 25. The increased quotations in most cases will reflect the full advances in mill prices. Hence, soft steel bars and small shapes for delivery out of warehouse will be 3c., base per lb., Pittsburgh, while plates and structural shapes will be 3.20c. Hot-rolled annealed sheets, No. 24, in quantities of 25 or more bundles, will be 3.40c. Buying has increased in anticipation of these advances.

Rails and Track Accessories

The Chesapeake & Ohio Railroad has placed about 10,000 tons of track fastenings. Light rails from billets and light rails from rail steel have been advanced \$3 a ton to \$35 and \$34, respectively, f.o.b. code basing points. An early announcement is expected concerning a revision in the price of certain track accessories.

Cold-Finished Steel Bars

Generally demand is holding up very well. Specifications from manufacturers of agricultural implements, textile machinery and household equipment are particularly encouraging. With the recent mark-up of \$3 a ton on hot-rolled bars, it is considered likely that a similar advance will eventually be effected on cold-finished bars, probably for the third quarter. Ground shafting is now being quoted generally on the cold-finished bar base, plus special extras. On June 1, these extras for ground shafting will be officially published, but, in the meantime, most producers have instituted the new basis for quoting.

Shapes and Plates

Plates are now established at 1.85c. for second quarter shipment. Current demand is divided between railroad equipment construction and Government work. Tank projects are not important, nor is barge work of major scope. Most specifications cover small tonnages, the aggregate of which far from provides mills with backlogs.

Makers of structural shapes in this district are now quoting 1.85c., Pittsburgh. Recent structural steel awards, practically all of which cover State highway bridges, were small both in number and total tonnage. Fresh specifications this week are featured by a State bridge over Yaquina Bay, Ore., which calls for 2100 tons.

Wire Products

A fair amount of contracting preceded the advances, which are now generally effective. Wire nails for the remainder of second quarter are now

established at \$2.60 a keg, Pittsburgh. Manufacturers' wire is quoted at 2.40c. a lb. Wire mill backlogs, though much improved, will not place a heavy strain on mills to fulfil second quarter commitments.

Tubular Products

Advances of \$6 to \$7 a ton on lap-weld, butt-weld and seamless steel pipe will be generally in effect this week. Oil country goods will be marked up likewise. Buying in anticipation of the higher prices has been moderate. Large line projects of a specific nature continue to be obscure.

Tin Plate

Although specifications are not maintaining their recent pace, tin plate mills have sufficient tonnage on books to hold the current operating rate of slightly better than 80 per cent for the next two or three weeks. Some independent mills continue to operate at capacity, while the leading producer in this district is holding steadily at 80 per cent. Export business continues to be an important outlet, particularly for heavy tin plate.

Strip Steel

Specifications against low-priced second quarter contracts are coming in rapidly. If these specifications are an indication of what might be expected later in the quarter, strip producers will be pressed to roll and ship all tonnage on books for the current period. Operations, however, have picked up only moderately.

Coal and Coke

With practically all important consumers covered by contract on coal and coke, this market remains fairly quiet. The possibility of further labor difficulties is beginning to wane, as working agreements in practically all important producing districts have apparently brought peace. Foundry coke trade in this district is limited, and furnace coke lacks the support of blast furnace demand.

Sheets

All grades of sheets at Pittsburgh are now being quoted at the new prices. The new sheet prices will probably remain nominal for a while, as most users are covered amply for second quarter at the old prices. The chief concern of producers, in laying out schedules for executing the heavy second quarter obligations, will be not so much with tonnage contracted for as with the special character of most sheet specifications. Some consumers are willing to anticipate their requirements for May and June, but the production of high-grade sheets against future shipping dates is not entirely practical, as some deterioration results from the stocking of highly finished sheets. Demand for furniture sheets has picked up remarkably in the past week; likewise calls for elec-

trical sheets. Common grades have not fared so well. With the tonnage in hand, producers expect an uptrend in operating schedules, but the inflow of specifications in April has not increased to the extent that sharp upward revisions in rolling schedules have been necessary. Operations this week are consequently unchanged at 50 to 55 per cent of capacity.

Scrap

Another week of consumer aloofness has broken down the resistance of scrap to lower price levels. Until recently yard dealers were releasing scrap very sparingly, except on higher prices. With most brokers now covered on orders, however, and with some large dealers in long positions, dealer buying prices have sagged, and brokers are now offering round-lot tonnages at below the recently quoted prices. No. 1 heavy melting steel is thus nominally lower at \$13.75 to \$14.25, and the likelihood is that firm offers from consumers would be acceptable at as low as \$14.00, or even lower. Other steel grades are sympathetically weaker. Machine shop turnings and short shoveling steel turnings are off 50c. A broker with large commitments for heavy breakable cast has raised his offering price 25c. a ton to \$11.75. The specialty group is holding up very well. Although the dearth of consumer interest in scrap is difficult to define in the face of continued expansion in open-hearth activity, the belief is growing that steel producers, who are generally committed for low-priced steel orders for second quarter, will endeavor to liquidate old scrap piles before entering the market for further tonnage.

New England Pig Iron Demand Subsides

BOSTON, April 24.—Most New England foundries have covered their pig iron requirements for the current quarter. There was a noticeable let-down in buying the past week, although the Mystic Iron Works sold better than 2000 tons in small lots. Aggregate sales by other furnaces were about 1200 tons. No inquiries of size are in the market. The New England melt is holding up well despite the fact that some foundries in Massachusetts have less work than at any time during the depression.

Scrap is moving in fair volume. Prices are firmer, yet still out of line with those for pig iron. Stocks in yards are largely made up of automobile scrap, so the floating supply of other materials is more or less limited. Dealers are paying \$8.50 a ton delivered for engine blocks, but are little interested in other automotive scrap. For Pittsburgh delivery, \$8 to \$8.05 a ton on cars shipping point is the market for No. 1 heavy melting

steel. For local consumption, breakable cast is \$8.50 to \$9 a ton, and for Pennsylvania, around \$7. The market for chemical borings is still hampered by held-up shipping instructions. A fair tonnage of textile cast was taken the past week by Providence, R. I., interests at \$8.75 to \$9 a ton, delivered. Supplies are fairly large. No. 1 machinery cast brings a substantial premium over textile. A Massachusetts consumer is paying \$6.50 a ton delivered for stove plate.

Buffalo Bookings of Pig Iron Unusually Heavy

BUFFALO, April 24.—With prices now at their higher levels, Buffalo pig iron producers have reached the end of the most active six weeks in the past three years. Sufficient tonnage was booked during the period to again establish that practically sold-up condition which used to characterize the pig iron market. While furnaces can accept more tonnage, some of them have taken enough to maintain active operation of their present going units until July. In the selling of the past few weeks several 1000 and 2000-ton lots were booked. Active stacks now are: at Bethlehem's Lackawanna plant, two; at Republic Steel Corp., two, and at Hanna Furnace Corp., two. Additional capacity will probably be put into service within the next month or two.

Bethlehem's Lackawanna plant continues to operate 15 open-hearths, Wickwire Spencer Corp., two, and Republic Steel Corp., five, including a 200-ton unit. The Seneca sheet division of Bethlehem remains on a 90 per cent basis.

Scrap

The largest scrap consumer in the district has suspended all shipments. This suspension will probably last till May 1. Larger dealers are being flooded with a volume of scrap from the smaller dealers. The market is soft and the principal consuming mill is now offering only \$12 for No. 1 heavy melting steel and \$10.50 for No. 2.

Two advertisements of a series run in THE IRON AGE by the Climax Molybdenum Co., New York, were recently awarded honors at the thirteenth annual exhibition of the Art Directors' Club at the RCA Building, New York. The advertisements won awards for art work and for layout of a complete advertisement.

Prices on Amsco nickel-manganese steel welding rods (U. S. Patent 1,815,464) have been revised, effective April 1, by the American Manganese Steel Co., Chicago Heights, Ill.

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Chicago Output Up Five Points to 59 Per Cent



Rail Releases Heavier—Nash Plants Resume Operations—Steel and Pig Iron Shipments Are Steadily Climbing

CHICAGO, April 24.—Shipments of steel mill products are pushing upward all along the line and ingot production has gained five points to 59 per cent of capacity. Immediate requirements by consumers are larger. The Nash plants are again in full swing and rail releases are heavier. A tractor plant is now at capacity output and shipments of reinforcing bars for road work are climbing very fast.

The threat of railroad labor trouble is creeping into the market as a factor that must be watched by consumers from the standpoint of having on hand adequate steel should transportation be hampered. Furthermore, mills realize their inability to clear contracts for the quarter if specifications are withheld until June and are urging users to speed specifications. This move is meeting with measurable success, many consumers having in mind the disagreeable experience they had in December when producers could not meet last minute demands.

The price advances may spur users to take all the steel that their financial strength will permit, and it therefore seems assured that mill operations will climb still higher and that a good rate will be maintained through May and June. Outstanding in this week's news is a long list of highway bridges that are coming out for figures. Most of these are located in the Middle West.

Pig Iron

Northern iron prices are now firmly established at \$18.50 a ton for the No. 2 grade. The rush of buying is over and sellers are concentrating on a drive to induce customers to spread specifications rather than let them accumulate until June. Current shipments are climbing, largely under the influence of heavier use of pig iron in jobbing shops. Some malleable shops are working virtually at capacity, although they are handicapped by a shortage of skilled molders. The whole situation points to May and June shipments being not only the best of the current year, but also the best in about a two-year period.

Reinforcing Bars

Distributors of reinforcing bars are

filing higher prices which will become effective near the end of the month. Advances are \$3 a ton on both the billet and rail steel bars. The real life in this market is the increased volume of shipments of road bars, though miscellaneous small inquiries are more numerous. The Sanitary District, Chicago, has announced the low bidder on 1300 tons, 725 tons of which represents a readvertised job on which Nash Brothers had been low at the first opening but were denied the right to close because of political connections.

Cast Iron Pipe

Not only is new business light but releases against old orders are growing smaller. It is probable that the round tonnage needed for the Milwaukee filter plant will come out for figures in the early summer. The Sanitary District, Chicago, and the Evanston, Ill., water department have placed small lots. The trade is expecting announcements of higher prices.

Wire Products

Specifications are coming in unusually freely and output has reached 50 to 55 per cent, thereby almost closing the gap that has recently existed between wire mill operations and the output of the heavier tonnage units. There are indications that the peak of rural demand has been reached, if not passed, for the present season. Business from the farm areas was unusually light and not much better than a year ago. It is tonnage placed by the manufacturing trade that has recently put books on a solid basis. New buying has slowed down appreciably, as was to have been expected at this date after the filing of new prices. Mesh of the type used for reinforced concrete is moving faster.

Sheets

In no steel mill product has there been more speculation than in sheets. Books are crowded with tonnage and some mills frankly admit there is no possibility of clearing them by the end of this quarter. The desire to assure delivery of adequate quantities was one factor in this rush for material on the part of buyers. A second influence was the price advance, and

still another factor is the possibility of railroad labor trouble. Roofers have entered liberal contracts notwithstanding that their business this spring was unusually light.

Rails and Track Supplies

Specifications for standard-section rails and accessories are growing. Aug. 31 is the final date for deliveries against contracts at current prices. No new rail purchases are reported, but miscellaneous orders for track supplies total 5000 tons. Both rail and track supply departments have speeded up operations.

Bars

Specifications for bar mill products are the best in months and second quarter commitments are heavy. The Nash plants are producing again and there is no letdown in bar demands from other automobile centers. Tractors for export and for work on which Government money has been provided are in heavy demand. One tractor plant in this area is operating at capacity.

Structural Material

Not far from 50,000 tons of structural materials will be needed for a great bridge program that is getting under way in Central Western States. These projects range in size from 6000 tons to 400 tons each. Bids on the Milwaukee filter plant have been rejected and will be readvertised. Awards are light and shops would not be able to hold their current output at 30 per cent of capacity were it not for the lock and dam work that was placed early in the spring.

Plates

Demand is scattered and largely confined to such tonnages as are needed for structural projects. Tank orders make their appearance infrequently but veiled inquiries point to larger use of plates in this direction. Bids will be opened April 28 on 1300 tons of pipe to be placed at Crede, Colo. The Barnsdall Oil Co. has ordered 500 tons for tanks to be located at Milwaukee and a new chemical plant proposed for the south end of Lake Michigan promises a round tonnage.

Scrap

Prices for scrap lean somewhat to the weak side, though transactions are few and a real measure of the market can scarcely be taken. Dealers' ideas are mixed, some believing that scrap will sell off while others look for a steady market, if not one that will climb to higher levels before summer. One very important influence in the market at this time is that of the short interests. Mill inspections are unusually rigid, especially on automobile scrap, much of which was prepared many months ago and does not quite conform to specifications mills are now insisting on.

Heavy Releases of Steel In New York Area



Delivery Dates Advance on Certain Products — New Pipe Discounts Effective Today—Railroad Releases Are Mounting

NEW YORK, April 24.—Steel specifications have been very heavy this month, in the case of certain mills being more than double total releases for March. In addition to regular contract business, an increasing amount of tonnage is coming from the railroads. Producers are cautioning buyers to file their specifications early enough so that the steel they have contracted for can be rolled before the expiration of the quarter. Even now some mills cannot promise deliveries on bars and certain grades of sheets before May 15.

Confusion still exists regarding the effective dates of new prices because of the different filing dates of various mills. Although in most cases mills are allowing ten days to elapse between the filing and effective dates, this is not the case with the advances on pipe. Some pipe producers filed on April 14, and others on April 17, which would make April 27 the effective date for the last filing. However, pipe jobbers buying from mills which had filed on April 14 would be at a disadvantage if other jobbers were permitted to postpone advances of their resale prices until April 27. To avoid this discrimination, all mills are making today (April 24) the effective date for their new discounts.

Recent price changes may be followed by the addition of new basing points, particularly on sheets. Consumers in certain important producing centers like Youngstown have been insistent in their demands for local base prices.

Billet steel reinforcing bars have been advanced \$3 a ton to 1.95c. a lb., Pittsburgh, for mill lengths, effective April 29. Prices at other basing points will take the usual differentials over Pittsburgh.

Tin plate releases have declined pending an expected renewal of specifying by the two largest can companies. The use of tin plate for the packaging of oil at service stations is threatened by the experimental use of cheaper products. Both electrolytic copper-coated sheets and terne plate are being tried, and paper manufacturers are pushing a paper container.

Pig Iron

Very little inquiry is in the market now that advanced prices are in effect. Second quarter sales made last week at the lower prices totaled 3700 tons, as compared with 8100 tons in the preceding period, and 17,000 tons booked two weeks ago. The base advance at Everett, Mass., which went into effect yesterday, concerned only foundry iron, as filings on the Bessemer, basic, and malleable grades designated April 30 as the effective date. A great proportion of the recent heavy sales will be delivered outside of this territory. Local melters are, however, considered to be overbought, and considerable third quarter carryover is expected unless foundry activity markedly improves. Therefore the present situation is apparently a repetition of that occurring late last year when heavy contracts made prior to a price advance resulted in a practical cessation of buying until books were opened for a new quarter.

Reinforcing Steel

Reinforcing bars will be \$3 a ton higher in this territory on and after May 1. There has been a good flow of small commitments during the past week, and the largest award was that of 1100 tons to Concrete Steel Co. for the first section of the Camden, N. J., approach to the Delaware River bridge. In addition, Kalman Steel Corp. and Truscon Steel Co. secured the awards of a number of small highway bridges in Pennsylvania, Massachusetts, and New Jersey. No definite announcement has yet been made concerning the 2200 tons required by a Federal warehouse at Washington, and other pending tonnages consist mostly of miscellaneous lots under 50 tons for highway structures in adjacent States.

Scrap

This market is quiet with brokers' prices on all grades unchanged from the previous week. The undertone is somewhat uncertain resulting from an apparent consumer disinterest in new commitments. Foreign purchasers likewise are delaying action in the hope that prices will materially soften. Despite these adverse influences,

brokers are buying moderately against booked orders, and, in view of the good export backlogs, there is little sentiment in favor of lower quotations to attract new accounts. There is practically no steel moving from this territory to Pennsylvania mills as prices for domestic delivery are far under brokers' bids for material to ship abroad.

Producers Have Large Backlogs in South

BIRMINGHAM, April 24.—Pig iron and steel producers now have sizable volumes of advance tonnage in most all lines. The announcement of higher prices brought a rush of new business, causing buyers to cover for the next three months. The movement was of satisfactory size and gives assurance of good second quarter production.

Pig Iron

A majority of the foundries served by this district are now completely covered for the second quarter at the old price of \$13.50. Contracting had been rather sluggish as the first quarter closed, but the advance of \$1 brought quick action.

Cast pipe plants have been considering price increases, but these are not being rushed, as most of the production this quarter will be with \$13.50 iron. One company received releases last week on two PWA orders, amounting to about 700 tons, which had been pending for more than six months.

Ten blast furnaces remain active. The coal strike in Alabama has not affected production of either the pig iron producers or the steel manufacturers. They have large stocks of coal and coke on hand.

Steel

Most of the new prices went into effect last week and the others became fixed on Monday. There were good bookings last week in all lines up to the effective dates of the higher quotations.

Last week 14 open-hearths were active, an increase of one unit over preceding weeks. The same number is scheduled for this week. The Tennessee company is working five out of nine at Fairfield and five out of nine at Ensley. Gulf States Steel is working four out of six at Alabama City.

Schiavone-Bonomo Corp., New York, dealer and broker of all kinds of iron and steel scrap for domestic and foreign accounts, has removed its offices to larger quarters in the Empire State Building.

Cleveland Rate Up Nine Points to 69 Per Cent



Good Operations Assured for Remainder of the Quarter—Electrical Sheets and Silvery Advanced — Automotive Plants Have Labor Troubles

CLEVELAND, April 24.—Specifications against recently placed contracts are now pouring into the mills in heavy volume and the steel industry appears to be assured good operations through the remainder of the quarter. Ingot output in the Cleveland-Lorain territory increased nine points to 69 per cent of capacity this week or to the high point reached early in March. One Cleveland steel plant has put on four additional open-hearth furnaces. The second blast furnace in Toledo has been put into operation as a result of a heavy increase in specifications for pig iron.

Labor troubles are presenting the only unfavorable factor in the situation. The Fisher Body plant in Cleveland was shut down Monday by a strike, causing entire suspension of production of Chevrolet body parts, and most of the Cleveland tool and die shops are tied up by a strike.

With the higher prices now prevailing on practically all products and consumers, with few exceptions, under cover, new business has virtually disappeared. Producers have well filled order books and are now turning their attention to getting in specifications in order to avoid the overcrowding of the mills in June. Consumers are issuing liberal releases, in many cases, for steel that they will not need for several weeks to make sure of getting orders on mill books in time for June delivery. This is particularly true of sheets, strip steel and bars. Many sheet consumers have already placed releases for June shipment. While many plants can anticipate their requirements, others, particularly jobbing stamping plants doing miscellaneous work, have difficulty in doing this. Business in some metal-fabricating plants has been stimulated, as these plants have advised their own consumers of probable price advances unless orders are placed in time to secure steel at the current contract prices.

New price advances include \$3 a ton to 2.65c. on axles, effective April 28; \$6 to \$8 a ton on electrical sheets; and 50c. a ton on Ohio silvery iron.

Pig Iron

Interest of producers will be centered for some time on shipping or-

ders, as new business disappeared when the \$1 a ton price advance became effective. Furnaces have heavy tonnages on their books for the balance of the quarter and shipping orders continue to come out in large volume. However, producers are turning some attention to consumers who may be somewhat dilatory in ordering out iron. The Interlake Iron Corp. blew in its second Toledo stack April 19 and is now operating three of its six Lake furnaces. A price advance of 50c. a ton on Ohio silvery iron has been filed by a Jackson County producer effective May 3.

Iron Ore

One producer has made commitments for the season against long-term contracts at last year's prices. However, leading local ore firms have not yet reached price agreements with the steel companies which they supply with ore under long-term contracts, and still regard the season's prices as not definitely established, although they still expect last season's prices to be reaffirmed. These ore firms are now working out requirement schedules with the steel companies. The Ford Motor Co., which inquired for 50,000 tons of ore, is reported to have covered for this ore and, while official confirmation is lacking, it is understood that the Ford company will secure its ore through a trade deal with a steel company.

Bars, Plates and Shapes

Steel bar specifications are very heavy. Practically all consumers are under contract. The \$3 a ton advance on bars is now generally in effect. The advance on billet steel reinforcing bars will be effective April 27. No advance has been made as yet on rail steel reinforcing bars. There is not much activity in the construction field. Local orders include 315 tons of reinforcing bars for State highway work.

Sheets

Specifications for heavy tonnages have reached the mills, many buyers evidently heeding the warning that if the placing of specifications for June is delayed until that month the inflow

of orders in June will be in excess of the productive capacity of the mills. While most specifications are for May shipment considerable tonnage has already been ordered for June delivery. Some of the mills in order to keep rolling schedules full are rolling some sheets this month that are not to be delivered until June. Few of the mills have set definite deadline dates for accepting specifications. Price advances of \$6 to \$8 a ton have been announced on electrical sheets effective April 27. New prices are field stock 3.05c.; armature grade 3.40c.; electrical grade 3.90c.; special motor grade 4.95c.; special dynamo grade 5.65c.; transformer grade 6.15c.; special transformer grade 7.15c.; extra special transformer grade 7.65c.

Strip Steel

A number of the leading consumers in the automotive field have announced that they will take out all the tonnage they contracted for recently for the quarter, and large releases are expected from this source shortly. Some material has already been ordered for June shipment. Practically all consumers are under contract at the old prices, and some of the mills will have difficulty in filling all orders should all consumers specify the full tonnage of their contracts.

Warehouse Business

Local warehouse prices have been marked up \$3 to \$5 a ton on most products effective April 27, the advance corresponding to the advance in mill prices. No. 24 galvanized and hot-rolled sheets are unchanged. Prices on these grades in light gages probably will not be marked up until about May 15.

Scrap

Steel-making grades have declined 50c. a ton. Weakness in the market is attributed to the continued restriction of shipments by local and Youngstown district mills, the large supply of scrap that is coming on the market which is in excess of the current demand, and the absence of any new buying by the mills.

Bauer-Wilson & Co., 310 South Michigan Avenue, Chicago, have been appointed exclusive sales agents for the Chicago-Milwaukee and Western territory for the silvery and Bessemer ferro-silicon pig iron produced by the Hanna Furnace Corp., Buffalo. Stocks are carried in Chicago and Detroit and at the furnaces in Buffalo. Bauer-Wilson & Co. have also made an exclusive sales agreement with the E. & G. Brooke Iron Co., Birdsboro, Pa., for the sale of their special 0.035 per cent low phosphorous pig iron in Michigan, Illinois, Indiana, Wisconsin and Iowa.

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Eastern Pennsylvania Steel Market Again Rather Quiet



Ingot Production Rises to 42 Per Cent of Capacity—Railroad Releases Well Maintained—Scrap Is Weaker

PHILADELPHIA, April 24.—With practically all consumers in this district now covered for the remainder of the quarter, the market is very dull from the standpoint of new business. Specifications, however, are well sustained and are increasing in the case of bars, sheets and strip steel. Structural steel and reinforcing bars continue rather quiet and plate releases are confined almost entirely to the railroads, shipments to a large shipbuilding plant in the vicinity being held up because of a strike.

Steel ingot production has expanded two points to 42 per cent of capacity. The leading interest is running at better than 50 per cent and many of the smaller independents who had been operating only single open-hearth furnace are now running two. Finishing mill schedules are heavier in the case of sheets, tin plate and bars. Makers of sheets are booked well into May on some finishes and the eastern tin plate capacity is fully engaged for some time to come.

Price advances on finished steel and pig iron are now generally effective in the Philadelphia area. The \$7 a ton increase in pipe quotations became effective today and a \$3 a ton advance on reinforcing bars will apply at the beginning of next week. Alloy steel bars were not advanced at Bethlehem, although a \$2 a ton increase was filed at the other basing points, placing this item on the same level at all selling points. A similar policy was followed on alloy steel ingot, blooms, billets and slabs.

The scrap market is weaker, lower prices being quoted on both No. 1 heavy melting steel and No. 1 cast.

Pig Iron

The market is now generally quoted at the new levels announced earlier in the month, although no sales at the higher prices are reported. Eastern Pennsylvania furnaces are now quoting basic iron at \$19, No. 2 foundry at \$19.50, malleable at \$20 and Bessemer at \$20.50. Low phosphorus iron is quoted at \$23.50, Birdsboro or Steelton, Pa. Orders booked during the month at the old prices were not sufficient to warrant the blowing in of any furnaces, although yard stocks are being depleted to some extent. Foundry operations are not expanding very rapidly.

Bars, Plates and Shapes

If releases from the railroads were eliminated this market would be rather quiet. Structural steel and reinforcing bar demand has not improved materially, although a fair volume of small orders is reported by some fabricators. The New York Shipbuilding Co. at Camden, N. J., is still tied up by a strike, but specifications from other shipyards are well maintained. General demand for merchant bars from miscellaneous manufacturing consumers is stronger. The United States Government will take new bids on the flying field at Middletown, Pa., requiring 3000 tons of structural steel. The last section of the high-speed approach to the Delaware River bridge, on which bids will be taken in a few weeks, will take 1000 tons of sheet steel piling and 700 tons of reinforcing bars. Concrete Steel Co. was awarded 1300 tons of bars for the section let recently.

Sheets

With contracting completed for the remainder of the quarter, mills are

devoting their attention to specifications in order that all customers may be accommodated during May and June. Two and three-week backlogs are now by no means uncommon on some finishes of sheets, and tin plate is equally active. Automobile body builders show no disposition to reduce their schedules and sheet demand from other sources continues to improve.

Warehousing Business

Philadelphia district warehouses have advanced prices on black and galvanized sheets \$8 a ton, the latter now being quoted at 4.40c. per lb. and the hot-rolled annealed grade at 3.80c., both for the No. 24 gage. No other price changes have been announced as yet, but are expected to come out soon in line with increased mill quotations.

Imports

The following iron and steel imports were received here last week: 1500 tons of chrome ore from Turkey; 88 tons of steel tubes, 35 tons of steel bars, 29 tons of steel forgings, 19 tons of C. D. steel wire and 3 tons of steel billets from Sweden, and 85 tons of steel bars and 45 tons of structural shapes from Belgium.

Scrap

A sale of 5000 tons of No. 1 heavy melting steel to a consumer in the district at \$11.50 has reduced the market on this grade 25c. a ton. Although the buyer has a comparatively low freight rate, the market seems to be definitely weaker in spite of the continued buying by exporters. No. 1 cast is also off slightly as some foundries are having no difficulty covering their needs at as low as \$12.50.

Cast Iron Pipe Active On Pacific Coast

SAN FRANCISCO, April 23.—Heavy buying of cast-iron pipe during the quarter is foreseen with the call for bids at San Francisco for 735 tons out of 17,000 tons involved in projects on which bonds have been voted. Oakland, Cal., will buy approximately 1000 tons before the end of the month. Fort Collins, Cal., has applied for a loan for water system improvements which will require 1600 tons. Fully 1300 tons of awards are expected shortly for various projects.

Following advances in mill prices, warehouse quotations have been marked up on all products with the exception of cold-finished steel. Buying, which was stimulated by the recent advances, has leveled off. Sheets and scrap remain active and demand for reinforcing steel is improving. Structural steel and plates have suffered from the lack of construction, although heavy tonnages of the latter

are included in Federal projects in the Northwest.

The official date for bids has been set for the Yakima Bay bridge in Oregon. This State structure will require 2000 tons of reinforcing bars and 2065 tons of structural steel. Silas Mason Co., 500 Fifth Avenue, New York, and Walsh Construction Co., Davenport, Iowa, were awarded the general contract for tunnels at the Fort Peck dam near Glasgow, Mont., and awards are expected soon on 3227 tons of bars, 2946 tons of shapes and 4943 tons of plates that are included in the specifications. It is reported that Ingalls Iron Works took 500 tons of structural steel for pier No. 3 at San Francisco. Bookings and new inquiries reported during the week were limited.

Rogers Brown-Lavino Co., dealer in pig iron, coke, and ferroalloys, has removed its New York office to the Singer Building, 149 Broadway. The telephone number at the new location is Rector 2-8538.

Warehouse Prices Up At Cincinnati

CINCINNATI, April 24.—Pig iron bookings have declined, since most consumers covered before the effective dates of new prices. Shipments against contracts are heavier, but furnace interests indicate that specifications are below the rate necessary to complete contracts this quarter. New bookings of the week, at about 350 tons, were all for prompt shipment. Foundry operations are sluggish, although a few stove and jobbing foundries report better than average business.

Coke

Specifications against contracts for foundry coke are at fair levels, oven interests reporting that fuel movement is comparable to that of 1930. Domestic grades are reacting to seasonal influences.

Warehouse Business

Price advances in several warehouse items, effective this week have been announced. The new schedules affect bars, plates, hoops, rivets and hot-rolled sheets. Bookings from industrial sources are at steady rate, but construction demand is below customary levels.

Steel

Heavy sheet ordering prior to April 15 loaded rolling schedules of district mills for the remainder of this month and the early part of May. Average production, however, is about 65 per cent of capacity. On certain hot-rolled items, mills are booked for the remainder of the quarter and have been forced, in a few instances, to reject new business. On heavy sheets, however, mills indicate a margin of operations over demand.

Scrap

District consumers are accepting scrap on old contracts, but new sales are made only at attractive quotations. Dealers are wary of speculative purchases, although yard supplies are being held for better prices.

St. Louis District Pig Iron Advanced

ST. LOUIS, April 24.—Mills are urging customers to specify promptly against contracts for sheets, especially in view of the fact that bookings are up to capacity and in some cases beyond, so that shipments may be made by the end of the quarter as required by the code. The effective date for the advances in wire products has not been set, but there has been some contracting in antici-

pation of the advance, although the movement from warehouses has been slow. Specifications for structural steel have been light, and pipe business is quiet.

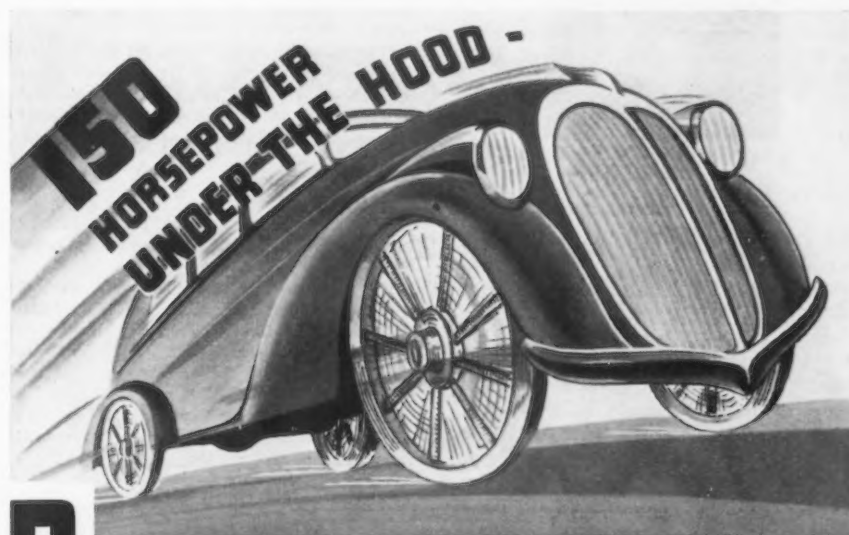
The Missouri Pacific Railway is in the market for 2000 tons of structural shapes for various bridge projects in Missouri, Arkansas, Louisiana and Texas. The State of Missouri has awarded 100 tons of oil storage tanks to the Standard Steel Works. The Laclede Steel Co. has been awarded 1500 tons of reinforcing bars for a Government dam project at Alton, Ill.

Production in the steel mills of the St. Louis industrial district is estimated to be 80 per cent higher than it was three weeks ago.

The St. Louis Gas & Coke Corp. last Friday advanced No. 2 foundry and malleable grades to \$18.50 a ton,

Granite City, and its basic grade to \$18, the increases being \$1 a ton for foundry and basic and 50c. a ton for malleable. While buying had been heavy for the last few weeks in anticipation of higher prices, there were some who waited to get in under the wire to place their requirements. Specifications against contracts have shown slight improvement.

The scrap market is firm, with very little buying by mills in this district, but with a large amount of material moving to the Chicago and Pittsburgh districts. The belief here is that the reserve piles of the mills in this territory have been greatly reduced and that replenishment buying will be necessary within the next two weeks. Railroad lists: Nashville, Chattanooga & St. Louis, 17 carloads; Mobile & Ohio, 30 carloads; Missouri-Kansas-Texas, 40 carloads. Prices are unchanged.



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Past-President of A. F. A. Dies of Pneumonia

SAMUEL T. JOHNSTON, who until his retirement in 1932 was vice-president of S. Obermayer Co., Chicago, died of pneumonia at his home in Riverside, Ill., on April 23. A native of Scotland, Mr. Johnston came to this country in 1889. His



S. T. JOHNSTON

first connection was with the Detroit Car Wheel Co. and later with the Detroit Foundry Equipment Co. Mr. Johnston was identified with the Whiting Corp. for 10 years prior to his connection with the S. Obermayer Co., which he joined in 1902. At the time of his death he was vice-president of the Standard Sand & Machine Co., Chicago, and had been appointed administration member for the marking devices industry code authority last week. He was a past-president of the American Foundrymen's Association and the Foundry Equipment Manufacturers' Association. He was 68 years old.

American Electro-Platers' Convention Program

THE annual convention of the American Electro-Platers' Association will be held in Detroit June 11 to 14 inclusive. Papers of a high order have been arranged for the Educational Session. The program is as follows:

Monday—June 11, 1 p. m.

1. "Summary of Researches on Plating at the Bureau of Standards"—Dr. W. Blum, Bureau of Standards, Washington, D. C.
2. "Complete Report of Exposure Tests on Plated Steel with Recommendations"—P. W. C. Strausser (Research Associate for the A.E.S.) and Dr. W. Blum.
3. "Plans for Investigating the Plating of Non-Ferrous Metals"—Dr. W. Blum.
4. "Testing of Plated Metals for Compliance with Federal Specifications"—M. R. Thompson, Bureau of Standards.

5. "Formal Discussion of Mr. Thompson's Paper"—By Wm. M. Phillips, General Motors Corp., Detroit, chairman, Joint Committee on Specifications for Plating.

Tuesday—June 12, 9 a. m.

1. "Nickel Plating"—Ray Goodsell (Milwaukee Branch, A.E.S.), Racine Plating Works, Racine, Wis.
2. "Bright Nickel Plating"—L. E. Eckelmann, Pyrene Manufacturing Company, Newark, N. J.
3. "Relation of Coating Thicknesses to Service Life on Zinc Die Castings"—E. A. Anderson, New Jersey Zinc Company, Palmerton, Pa.
4. "Ductility and Adhesion of Nickel Deposits"—F. P. Romanoff, Apollo Metal Works, LaSalle Ill. (Electrochemical Society Meeting, Asheville, N. C., April 26, 1934).

Tuesday—June 12, 8 p. m.

1. "Detergent Properties of Alkalies, Part I, Plating Room Cleaners," N. Promisel, Research Electrochemist, International Silver Co., Meriden, Conn.
2. "Pictorial Study of Plating Conditions"—Wm. M. Phillips, Research Engineer, General Motors Corp., Detroit, Mich.
3. "Does Chemical Control of Plating Solutions Solve the Electroplaters' Problems?"—Geo. B. Hogaboom (Newark Branch, A. E. S.), Research Engineer, Hanson-Van Winkle-Munning Co., Matawan, N. J.

Wednesday—June 13, 9 a. m.

1. "Recent Progress in Industrial Cleaning"—R. W. Mitchell, Magnus Chemical Co., Garwood, N. J.
2. "Plating Plant Layout"—A. J. Lupien (Detroit Branch A. E. S.), Udylite Process Co., Detroit, Mich.
3. "Copper Cyanide Plating, Its Peculiarities"—Elmer Woodmansee (Detroit Branch A. E. S.).
4. "Concentrated Cyanide Plating Baths"—Dr. L. E. Pan, U. S. Research Corp., Long Island City, N. Y.

Thursday—June 14, 1 p. m.

1. "Rust Proofing before Color Finishing"—R. R. Tanner, Metal Finishing Research Corp., Detroit, Mich.
2. "Rubber in the Plating Industry"—R. H. Kittner, American Hard Rubber Co., Akron, Ohio.
3. "Some New Developments in Buffing Compositions"—Geo. M. Cunningham, National Oil Products Co., Harrison, N. J.
4. "Chromium Plating on Sheet Zinc"—Chas. H. Proctor (New York Branch A. E. S.), founder of the society.

Additional Code Hearings Scheduled

A HEARING will be held May 8 before Deputy Administrator L. S. Horner on the proposed code for the complete wire and iron fence industry. The hearing was adjourned from April 17. The code is supplemental to the basic code for the fabricated metal products code.

On May 10 Deputy Horner will preside at a hearing on a code for the pipe tool and vise manufacturing industries, also supplemental to the fabricated metal products code.

Steel Corporation Shows Better Quarterly Statement

THE finance committee of the United States Steel Corp. issued the following statement, April 24, accompanying the usual statement of earnings for the first quarter of 1934:

Operations for the first quarter of 1934, based on production of finished products for sale, were 29 per cent of capacity, compared with 30.8 per cent in the last quarter of 1933, and 15.8 per cent in the first quarter of 1933.

Shipments of finished products in the first quarter of 1934 totaled 1,305,000 tons compared with 1,603,000 in the final quarter of 1933, a decrease of 18.6 per cent.

Earnings for the first quarter of 1934 were \$6,578,731 compared with \$5,587,000 in the preceding quarter.

After allowances for depletion and depreciation (amounting to \$10,795,225) and interest on bonds and other charges, the net result for the quarter is a deficit of \$6,989,965. The dividend at rate of 50 cents a share declared on preferred stock calls for \$1,801,405, making the net reduction in surplus during the quarter \$8,791,370, compared with a similar reduction in the last quarter of 1933 of \$9,728,692.

The general wage advance effective April 1, which extended to the entire steel industry, increased by an average of 10 per cent all wage rates and the salaries of employees receiving \$3,000 or less per annum, of the manufacturing and iron ore mining subsidiary companies; also of employees of some of the auxiliary affiliated companies. In the case of the coal mining subsidiary companies, increases in wage rates averaged considerably more than 10 per cent through the code conditions providing for a 7-hr. versus an 8-hr. day. These wage advances on basis of the volume of employment in March will increase the monthly pay roll approximately \$1,500,000.

Since April 1 and to date operations have averaged about 38 per cent of capacity. There are some indications that this rate of operations will be continued and possibly exceeded during the second quarter, March operations having shown a very satisfactory advance over those of the two previous months.

The American Iron and Steel Institute will reprint the Book of Uniform Extras and Deductions because many changes and corrections have been found necessary. The revised edition is to become effective June 1, and will be in the hands of purchasers on that date. The price of this edition is to be the same as heretofore, \$1 per copy.

Additional Price Filings On Pig Iron

MORE recent filings of price advances on pig iron than those listed in THE IRON AGE of April 19, page 65, are given below. The appended list also contains corrected dates for Hamilton, Ohio, Everett, Mass., and Neville Island, Pa. No effective dates for foundry iron at Buffalo or Birmingham have yet been released by the American Iron and Steel Institute.

Product and Basing Points	Pig Iron Base Price Per Gross Ton	Effective Date of New Price
Basic:		
Everett	\$19.00	April 30
Hamilton	18.00	April 17
No. 2 Foundry:		
Neville Island..	18.50	April 28
Buffalo	20.00	April 30
Hamilton	18.50	April 17
Birmingham
Malleable:		
Neville Island..	18.50	April 28
Everett	20.00	April 30
Hamilton	18.50	April 17
Bessemer:		
Everett	20.50	April 30
Low Phosphorus:		
Birdsboro	23.50	April 28
Johnson City, Tenn.	19.50	April 28

Ohio Steel Treaters Discuss Grain Size

"GRAIN SIZE IN STEEL" was the topic of the annual tri-chapter meeting of the Cincinnati, Dayton and Columbus, Ohio, chapters of the American Society for Metals, which was held in Columbus, on April 24, at the Battelle Memorial Institute. At the afternoon session Dr. C. H. Herty, Jr., director of research, Mining and Metallurgical Advisory Board to the Carnegie Institute of Technology, read a paper on "Steel Making and Grain Size Control." C. E. Sims, metallurgist, American Steel Foundries, discussed grain size in steel castings, and R. L. Kenyon, metallurgist, American Rolling Mill Co., took for his subject the importance of grain size of sheet steel for deep drawing. H. W. McQuaid, metallurgist, Republic Steel Corp., made the principal address at the dinner meeting at the Columbus Athletic Club, his topic being "Grain Size in Carburizing and Forging Steels."

Industrial uses of thallium, including its addition to lead-base alloys for bearings and its application as an alloying element to render silver stainless, as a basis for coloring glass and facilitating the manufacture of gems and as an ingredient to render motor fuel non-knocking, are enumerated in a pamphlet on recent developments in the preparation and uses of thallium, written by Dr. James C. Munch, Bureau of Biological Survey, Washington, and published for general

distribution by the Foote Mineral Co., Inc., 1609 Summer Street, Philadelphia. The paper discusses sources and production, the cost, supply and demand factor and the numerous fields of use outside of the purely industrial.

Electric power costs in the foundry range from 3.3 to 38 per cent of the selling price of castings, according to an exhaustive investigation of a power committee which, under the auspices of the American Foundrymen's Association, studied conditions in gray iron, steel and malleable iron foundries. The average for jobbing foundries is between 20 and 30 per cent. Plants making their own power showed an average cost per kilowatt-hour for 1932 of 1.03 cents. The report in detail and a record of a conference held to consider it have been published

in pamphlet form for sale by the association at \$1 a copy; the association's headquarters are at 222 West Adams Street, Chicago.

German steel specifications have been translated into English and compiled into pamphlet form for distribution to English speaking peoples as a market extension instrument. It is the work of the German industry through the Deutscher Normenausschuss and is published by Beuth-Verlag, 97 Dresdener Strasse, Berlin SW 19, Germany, at 2 marks a copy. In its 85 pages are tabulated the dimensions, tolerances, physical characteristics, methods of test of all the general forms of ordinary steel and also of alloy steels with standard heat-treating practices. Both cast steel and cast iron are included in this booklet of materials standards.

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F.o.b. Birmingham	2.05c.
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F.o.b. cars Gulf ports	2.30c.

Rail Steel	
(For merchant trade)	
F.o.b. Cleveland	1.85c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Pittsburgh	1.80c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Billet Steel Reinforcing	
(Cut lengths as quoted by distributors)	
F.o.b. P'gh mills	1.90c.
F.o.b. Birmingham	1.95c.
F.o.b. Buffalo	1.95c.
Del'd Detroit	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. cars dock Pacific ports	2.45c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. Chicago	1.95c.

Rail Steel Reinforcing	
(Cut lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.75c.
F.o.b. Cleveland	1.80c.
F.o.b. Chicago	1.80c.

Iron	
Common iron, f.o.b. Terre Haute, Ind.	1.60c. to 1.75c.
Refined iron, f.o.b. P'gh mills	1.75c.
Common iron, del'd Philadelphia	1.85c.
Common iron del'd New York	1.93c.

Steel Car Axles	
F.o.b. Pittsburgh	2.65c.
F.o.b. Chicago	2.65c.
F.o.b. Birmingham	2.65c.

Tank Plates	
Base per Lb.	
F.o.b. Pittsburgh mill	1.85c.
F.o.b. Chicago	1.90c.
F.o.b. Gary	1.90c.
F.o.b. Birmingham	1.90c.
Del'd Cleveland	2.05c.
Del'd Philadelphia	2.05c.
F.o.b. Coatesville	1.95c.
F.o.b. Sparrows Point	1.95c.
Del'd New York	2.15c.
F.o.b. cars dock Pacific ports	2.40c.
F.o.b. cars dock Gulf ports	2.25c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates	
F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.

Structural Shapes	
Base per Lb.	
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.95c.
F.o.b. Bethlehem	1.95c.
Del'd Cleveland	2.05c.
Del'd Philadelphia	2.05c.
Del'd New York	2.10c.
F.o.b. cars dock Gulf ports	2.25c.
F.o.b. cars dock Pacific ports (standard)	2.40c.

Steel Sheet Piling	
Base per Lb.	
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago mill	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

Alloy Steel Bars	
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.55c. a lb.
Open-hearth grade, base	2.70c.
Delivered price at Detroit is	2.70c.

Series	
Numbers	
2000 (1/2% Nickel)	0.25
2100 (3/4% Nickel)	0.55
2300 (3/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Vanadium Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/2c. per

lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Cold Finished Bars and Shafting*	
Base per Lb.	
Pittsburgh mill	2.10c.
Chicago	2.15c.
Cleveland	2.15c.
Buffalo	2.20c.
Detroit	2.30c.
Eastern Michigan	2.35c.

* In quantities of 10,000 to 100,000 lb.

SHEETS, STRIP, TIN PLATE

TERNE PLATE	
Sheets	
Hot Rolled	
Base per Lb.	
No. 10, f.o.b. Pittsburgh	2.00c.
No. 10, f.o.b. Gary	2.10c.
No. 10, del'd Detroit	2.20c.
No. 10, del'd Phila.	2.25c.
No. 10, f.o.b. Birmingham	2.15c.
No. 10, f.o.b. cars Pacific ports	2.55c.

Hot-Rolled Annealed	
No. 24, f.o.b. Pittsburgh	2.65c.
No. 24, f.o.b. Gary	2.75c.
No. 24, del'd Detroit	2.85c.
No. 24, del'd Phila.	2.94c.
No. 24, f.o.b. Birmingham	2.80c.
No. 24, f.o.b. cars Pacific ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled	
No. 10 gage, f.o.b. Pittsburgh	2.55c.
No. 10 gage, f.o.b. Gary	2.65c.
No. 10 gage, del'd Detroit	2.75c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. cars Pacific ports	3.25c.

Light Cold-Rolled	
No. 20 gage, f.o.b. Pittsburgh	3.15c.
No. 20 gage, f.o.b. Gary	3.25c.
No. 20 gage, del'd Detroit	3.35c.
No. 20 gage, del'd Phila.	3.44c.
No. 20 gage, f.o.b. cars Pacific ports	3.70c.

Galvanized Sheets	
No. 24, f.o.b. Pittsburgh	3.25c.
No. 24, f.o.b. Gary	3.35c.
No. 24, del'd Phila.	3.54c.
No. 24, f.o.b. Birmingham	3.40c.
No. 24, f.o.b. cars Pacific ports	3.85c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes	
No. 24, unassorted 8-lb. coating	3.65c.
F.o.b. Pittsburgh	3.65c.
No. 20, f.o.b. Pittsburgh	3.20c.

Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.85c.
No. 28, Gary	2.95c.

Tin Plate	
Base per Box	
Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate	
(F.o.b. Pittsburgh)	
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.	
All widths up to 24 in., P'gh	2.00c.
All widths up to 24 in., Chicago	2.10c.
All widths up to 24 in., del'd Detroit	2.20c.
Copperage stock, Pittsburgh	2.10c.
Copperage stock, Chicago	2.20c.

Cold-Rolled Strips	
F.o.b. Pittsburgh	2.80c.
F.o.b. Cleveland	2.80c.
Del'd Chicago	3.08c.
F.o.b. Worcester	3.00c.

Fender Stock	
No. 17 and lighter, Pittsburgh or Cleveland	3.20c.

WIRE PRODUCTS

To Manufacturing Trade	
Per Lb.	
Bright wire	2.30c.
Spring wire	3.20c.

To Jobbing Trade	
Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of \$2 a ton is made to jobbers on straight, mixed or joint carloads; \$3 a ton is allowed on less-than-carload shipments.	

Standard wire nails	
Base per Keg	
Smooth coated nails	\$2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Smooth annealed wire	
Base per 100 Lb.	
Smooth galvanized wire	2.85
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING	
Welded Pipe	
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills	
Butt Weld	
Steel	
Inches	
1/2	26
3/4	35
1	45
1 1/4	55
1 3/4	62
2	64

Wrought Iron	
Inches	
1/2	26
3/4	35
1	45
1 1/4	55
1 3/4	62
2	64

Lap Weld	
2	60
2 1/2	63
3	65
3 1/2	68
4	70
4 1/2	72
5	74
5 1/2	76
6	78
6 1/2	80
7	82
7 1/2	84
8	86
8 1/2	88
9	90
9 1/2	92
10	94
10 1/2	96
11	98
11 1/2	100
12	102

Butt Weld, extra strong, plain ends	
1/2	30
3/4	38
1	47
1 1/4	56
1 3/4	61
2	63

Lap Weld, extra strong, plain ends	
1/2	26
3/4	35
1	45
1 1/4	55
1 3/4	62
2	64

Boiler Tubes	
Base Discounts, f.o.b. Pittsburgh	
Steel	
2 in. and 2 1/4	33
2 1/2 in.—2 3/4 in.	40
3 in.	44
3 1/2 in.—3 3/4 in.	47
4 in.	49
4 1/2 in. to 6 in.	42

Charcoal Iron	
1 1/2 in.—1 3/4 in.	44
2 in.—2 1/4 in.	43
2 1/2 in.—2 3/4 in.	46
3 in.	47
3 1/2 in. to 3 3/4 in.	18
4 in.	20
4 1/2 in. to 6 in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives.	
Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five. Exception: On 1 1/2 to 1 3/4-in. charcoal iron tubes no supplementary discounts are granted, and the discount for 10,000 lb. to a carload is 4 points under base and for less than 10,000 lb. 8 points under base.	

Standard Commercial Seamless Boiler Tubes	
Cold-Drawn	
1 in.	68
1 1/4 to 1 1/2 in.	68
1 3/4 in.	68
2 to 2 1/4 in.	27
2 1/2 to 2 3/4 in.	34
3 in.	34
3 1/2 to 3 3/4 in.	47
4 in.	49
4 1/2, 5 and 6 in.	42

In the case of all sizes except 1-in. to 1 1/4-in. cold-drawn boiler tubes supplementary discounts of two 5 per cents are allowed on carload lots. On quantities up to 10,000 lb. the base discount is reduced 10 points and a supplementary discount of 5 per cent only is allowed. On quantities 10,000 lb. to 24,999 lb. the base discount is reduced 6 points and a supplementary discount of 5 per cent only is allowed. On 25,000 lb. to a carload the base discount is reduced 2 points and supplementary discounts of two 5 per cents are allowed.

On 1 to 1 1/4-in. cold-drawn boiler tubes, there are no supplementary discounts. On quantities up to 10,000 lb. the base discount is reduced 12 points; on 10,000 lb. to 24,999 lb. it is reduced 8 points; on 25,000 lb. to a carload it is reduced 2 points.

Seamless Mechanical Tubing	
Per Cent Off List	
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 3.30% to 40% base	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

RAILS AND TRACK SUPPLIES	
F.o.b. Mill	
Standard rails, 60-lb. and heavier	\$36.37 1/2
per gross ton	
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points	
Light rails (from billets) per gross ton	\$35.00
Light rails (from rail steel) per gross ton	\$4.00

Base per 100 Lb.	
Spikes, 9/16 in. and larger	\$2.40
Spikes, 1/2 in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS	
Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Per Cent Off List	
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and L. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts	70
S.A.E.	70
Stove bolts in packages, P'gh	70, 25 and 10
Stove bolts in packages, Ch'go.	70, 25 and 10
Stove bolts in packages, Cleveland	70, 25 and 10
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets	
(1/2-in. and larger)	
Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$3.00
F.o.b. Chicago	3.10
F.o.b. Birmingham	3.15

Small Rivets	
(7/16-in. and smaller)	
Per Cent Off List	
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws	
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)	
Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled standard set screws, cut thread 1/2 in. and smaller	75
Upset hex. head cap screw, 1 in. dia. and smaller	85
Upset set screws cut and oval point	75 and 10
Milled studs	65 and 10

STAINLESS STEEL	
(18% Cr. 8% Ni. 0.08 to 0.12% C) (Base Prices, f.o.b. Pittsburgh)	
Per Lb.	
Bars	23c.
Plates	25c.
Sheets	25c.
Hot-rolled strip	25c.
Cold-rolled strip	27c.

SEMI-FINISHED STEEL	
Billets, Blooms and Slabs	
F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham	
Per Gross Ton	
Revolving	\$29.86
Forging quality	

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$38.00
Cleveland	38.00
Chicago	39.00
Birmingham	41.00
Youngstown (del'd)	39.00

ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b. Pittsburgh, Chicago, Buffalo, Maillon, Canton or Bethlehem.
Base price, \$51 a gross ton.
Price del'd Detroit is \$54.

CARBON STEEL FORGING INGOTS

F.o.b. Pittsburgh, Youngstown, Gary or Chicago.
Uncropped, \$31 per gross ton.

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville	\$3.85
Prompt	
Furnace, f.o.b. Connellsville	\$4.60 to 5.60
Foundry, by-product, Chicago	
ovens, for delivery outside	8.50
switching district	
Foundry, by-product, delivered	9.25
in Chicago switching	
district	
Foundry, by-product, New	11.00
England, delivered	
Foundry, by-product, Newark	8.20 to 8.81
or Jersey City, del'd	
Foundry, by-product, Phila.	9.00
land, delivered	
Foundry, by-product, Cleve-	9.25
land, delivered	4.75
Foundry, Birmingham	
Foundry, by-product, St.	8.00
Louis, f.o.b. ovens	
Foundry, by-product, del'd	9.00
St. Louis	

Coal

	Per Net Ton
Mine run steam coal, f.o.b.	
W. Pa. mines	\$1.80 to \$2.05
Mine run coking coal f.o.b.	
W. Pa.	2.05 to 2.25
Gas coal, 1/2-in. f.o.b. Pa.	2.25 to 2.55
Mine run gas coal, f.o.b. Pa.	2.05 to 2.45
mines	
Steam slack, f.o.b. W. Pa.	1.55 to 1.65
mines	
Gas slack, f.o.b. W. Pa.	1.90 to 2.10
mines	

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. del'd Chicago
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.00c.
	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works
High-heat intermediate	
Duty Brick Duty Brick	
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	45.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per	
ton	7.00

Chrome Brick

	Per Net Ton
Standard size	\$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Balti-	
more and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore	45.00
and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd	
Chicago	\$44.00 to \$45.00
4-in., del'd Chicago	47.00 to 48.00
6-in. and larger, del'd New York	43.00
4-in. del'd New York	46.00
6-in. and larger, Birmingham	36.00 to 37.00
4-in. Birmingham	39.00 to 40.00
Class "A" and gas pipe, \$3 extra	

Pig Iron, Ores, Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$19.00	\$18.00	\$19.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Sveceland, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	18.00	17.00	18.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	17.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.50
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	19.00
Duluth, Minn.	19.00	19.00	18.50	19.50
Birmingham	13.50	13.50	12.50	19.00
Provo, Utah	17.50	17.50	17.50	19.00

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	\$20.00	\$19.50	\$18.50	\$20.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.				
From East Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia				
From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati				
From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio				
From Cleveland and Youngstown	19.76	19.76	19.01	20.01
Columbus, Ohio				
From Hamilton, Ohio	20.50	20.50	19.01	20.01
Mansfield, Ohio				
From Cleveland and Toledo	20.26	20.26	19.01	20.01
Indianapolis				
From Hamilton, Ohio	20.77	20.77	19.01	20.01
South Bend, Ind.				
From Chicago	20.55	20.55	19.01	20.01
Milwaukee				
From Chicago	19.50	19.50	18.00	19.00
St. Paul				
From Duluth	20.44	20.44	18.00	19.00
Davenport, Iowa				
From Chicago	20.26	20.26	18.00	19.00
Kansas City				
From Granite City	21.04	21.04	18.00	19.00

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa. Steel-	
ton, Pa. and Standish, N. Y.	\$23.00 to \$23.50
Johnson City, Tenn.	19.00
Del'd Chicago	24.65

GRAY FORCE PIG IRON

Valley furnace	\$17.50
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CHARCOAL PIG IRON

Lake Superior furnace	\$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

CANADA

Pig Iron

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard,	\$77.50
(carload)	
Domestic, 80%, seaboard,	85.00
(ton lots)	
Malleable	92.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	\$32.25
50% (ton lots)	35.00
75% (carloads)	35.00
75% (ton lots)	36.00
14% to 16% (f.o.b.) Welland,	31.00
Ont. (in carloads) (duty paid)	38.50
14% to 16% (less carloads)	38.50

Silvery Iron

	Per Gross Ton	Per Gross Ton
F.o.b. Jackson, Ohio, Furnace		
6%	\$22.25	12% \$29.25
7%	23.25	13% 30.75
8%	24.25	14% 32.75
9%	25.25	15% 33.75
10%	26.25	16% 35.25
11%	27.75	17% 36.75

Bessemer Ferrosilicon

	Per Gross Ton	Per Gross Ton
F.o.b. Jackson, Ohio, Furnace		
10%	\$27.25	14% \$33.25
11%	28.75	15% 34.75
12%	30.25	16% 36.25
13%	31.75	17% 37.75
Manganese 1 1/2 to 3%, \$1 a ton additional.		
For each unit of manganese over		
3%, \$1 a ton additional. Phosphorus		
0.75% or over, \$1 ton additional.		

Other Ferroalloys

Ferrotungsten, per lb. contained W.	
del., carloads	\$1.25 to \$1.25
Ferrotungsten, less carloads 1.30 to 1.35	
Ferrocromium, 4 to 6% carbon	
and up, 65 to 70% Cr. per lb.	
contained Cr. delivered, in car-	
loads	10.00c.
Ferrocromium, 2% car-	
bon	16.50c. to 17.00c.
Ferrocromium, 1% car-	
bon	17.50c. to 18.00c.
Ferrocromium, 0.10%	
carbon	19.50c. to 20.00c.
Ferrocromium, 0.06%	
carbon	20.00c. to 20.50c.

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$13.75 to \$14.25
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	13.75 to 14.25
Scrap rails	14.00 to 14.50
Rails 3 ft. and under	15.50 to 16.00
Sheet bar crops, ordinary	15.00 to 15.50
Compressed sheet steel	13.50 to 14.00
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	12.50 to 13.00
Machine shop turnings	10.00 to 10.50
Short shov. steel turnings	10.00 to 10.50
Short mixed borings and	
turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Cast iron car wheels	13.00 to 13.50
Heavy breakable cast	11.75 to 12.25
No. 1 cast	13.50 to 14.00
Rail, knuckles and coup-	
lers	16.00 to 16.50
Rail coil and leaf springs	16.00 to 16.50
Roller steel wheels	16.00 to 16.50
Low phos. billet crops	17.00 to 17.50
Low phos. sheet bar crops	16.50 to 17.00
Low phos. plate scrap	15.50 to 16.00
Low phos. punchings	16.00 to 16.50
Steel car axles	17.00 to 17.50

CHICAGO

Delivered Chicago district consumers:	
Heavy melting steel	\$11.50 to \$12.00
Automobile hvy. melt. steel	10.75 to 11.25

Ferrovanadium, del., per	
lb. contained V.	\$2.70 to \$2.90
Ferrocobaltititanium, 15 to 18%	
Ti. 6 to 8% C. f.o.b. furnace	
carload and contract per net ton	\$137.50
Ferrophosphorus, electric, or blast	
furnace material, in carloads,	
18%, Rockdale, Tenn., base, per	
gross ton with \$2 unitage	50.00
Ferrophosphorus, electric, 24%	
f.o.b. Anniston, Ala., per gross	
ton with \$2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo.,	
del.	80c.
Silico spiegel, per ton, f.o.b. fur-	
nace, car lots	\$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, deliv-	
ered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	\$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower

	Per Gross Ton
Old range, Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.50%	
iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.f.f. Philadelphia or

	Per Unit
Baltimore	
Iron, low phos., copper free, 55	
to 58% iron, dry Spanish or	
Algerian	9.50c.
Iron, low phos., Swedish, average	
68 1/2% iron	9.50c.
Iron, basic or foundry, Swedish,	
average, 65% iron	9c.
Iron, basic or foundry, Russian,	
aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	24c.
Manganese, African, Indian, 44-	
48%	21c.
Manganese, African, Indian, 49-	
51%	24c.
Manganese, Brazilian, 46 to 48%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty	
paid, delivered	\$15.00
Tungsten, domestic scheelite, de-	
livered	\$15.50 to 15.00

	Per Gross Ton
Chrome, 45%, Cr2O3, crude, c.i.f.	
Atlantic Seaboard	\$17.00
Chrome, 48% Cr2O3, c.i.f. At-	
lantic Seaboard	20.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b.	
Kentucky and Illinois mines for	
all-rail shipment	\$17.00
Same grade for Ohio River barge	
shipment for Kentucky and Illinois	
River landings	18.50
No. 2 lump, 85-5, f.o.b. Kentucky	
and Illinois mines	\$17.50 to 18.00
Foreign, 85% calcium fluoride, not	
over 5% silicon, c.i.f. Atlantic	
port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to	
98% calcium fluoride, not over	
2 1/2% silicon, f.o.b. Illinois and	
Kentucky mines	30.00

Iron and Steel Scrap

Shoveling steel	\$11.50	\$12.00
Hydraulic comp. sheets	10.75 to	11.25
Drop forge flashings	9.75 to	10.25
No. 1 busheling	10.50 to	11.00
Roller carwheels	12.50 to	13.00
Railroad tires	12.50 to	13.00
Railroad leaf springs	12.50 to	13.00
Axle turnings	9.50 to	10.00
Steel couples and knuckles	12.25 to	12.75
Coil springs	12.75 to	13.25
Axle turnings (elec. fur.)	10.50 to	11.00
Low phos. punchings	12.25 to	12.75
Low phos. plates, 12 in. and under	12.75 to	13.25
Cast iron borings	7.25 to	7.75
Short shoveling turnings	7.75 to	8.25
Machine shop turnings	7.00 to	7.50
Rolling rails	12.50 to	13.00
Steel rails, less than 3 ft.	12.50 to	13.00
Steel rails, less than 2 ft.	13.00 to	13.50
Angle bars	11.75 to	12.25
Rolling carwheels	11.75 to	12.25
Railroad malleable	12.00 to	12.50
Agricultural malleable	10.00 to	10.50

No. 2 busheling	\$4.50 to \$5.00
Locomotive tires, smooth	10.50 to 11.00
Pipe and flue	5.50 to 6.00
No. 1 machinery cast	9.50 to 10.00
Clean automobile cast	9.00 to 9.50
No. 1 railroad cast	9.00 to 9.50
No. 1 agricultural cast	8.00 to 8.50
Store plate	7.50 to 8.00
Grate bars	6.50 to 7.00
Brake shoes	8.50 to 9.00

PHILADELPHIA

Per gross ten delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50
No. 2 heavy melting steel	9.50 to 10.00
No. 1 railroad wrought	12.00 to 13.00
Bundled sheets	9.50
Hydraulic compressed, new	10.00
Hydraulic compressed, old	8.50 to 9.00
Machine shop turnings	7.50
Heavy axle turnings	10.00 to 10.50
Cast borings	5.50 to 6.00
Heavy breakable cast	11.50 to 12.00
Store plate (steel works)	16.50
No. 1 low phos. heavy	15.00 to 15.50
Couplers and knuckles	14.50 to 15.00
Roller steel wheels	14.50 to 15.00
No. 1 blast furnace	5.50 to 6.00
Spec. iron and steel pipe	9.00 to 9.50
Shafting	16.00 to 16.50
Steel axles	14.50
No. 1 forge fire	11.00
Cast iron car wheels	13.00
No. 1 cast	12.50 to 13.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	13.00

CLEVELAND

Per gross ten delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	11.00 to 11.50
Compressed sheet steel	11.00 to 11.50
Light bundled sheet stampings	8.50 to 9.00
Drop forge flashings	11.00 to 11.50
Machine shop turnings	9.00 to 9.50
Short shoveling turnings	9.00 to 9.50
No. 1 busheling	10.50 to 11.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.50 to 15.00
Cast iron borings	9.00 to 9.50
Mixed borings and short turnings	9.00 to 9.50
No. 2 busheling	9.00 to 9.50
No. 1 cast	11.00 to 11.50
Railroad grate bars	7.50 to 8.00
Store plate	7.00 to 7.50
Rails under 2 ft.	15.00 to 15.50
Rails for rolling	16.50 to 17.00
Railroad malleable	12.00 to 12.50
Cast iron car wheels	12.25

BUFFALO

Per gross ten, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$12.50
No. 2 heavy melting steel	11.00 to 11.50
Scrap rails	\$12.00 to \$12.50
New hydraulic, comp. sheets	11.00
Old hydraulic, comp. sheets	10.50
Drop forge flashings	11.00
No. 1 busheling	11.00
Hvy. steel axle turnings	9.00 to 9.50
Machine shop turnings	9.00 to 9.50
Knuckles and couplers	14.00 to 14.50
Coil and leaf springs	14.00 to 14.50
Roller steel wheels	14.00 to 14.50
Low phos. billet crops	14.00 to 14.50
Short shov. steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
No. 2 busheling	7.50 to 8.00
Steel car axles	13.00 to 13.50
Iron axles	13.00 to 13.50
No. 1 machinery cast	11.00 to 11.50
No. 1 cupola cast	10.00 to 10.50
Store plate	10.00 to 10.50
Steel rails, 8 ft. and under	14.50 to 15.00
Cast iron car wheels	12.50 to 13.00
Industrial malleable	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Chemical borings	10.00 to 11.00

BIRMINGHAM

Per gross ten delivered consumers' yards:	
Heavy melting steel	\$10.00
Scrap steel rails	9.00
Short shoveling turnings	5.50
Store plates	\$7.00 to \$7.50
Steel axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	7.00
Rails for rolling	10.50
No. 1 cast	9.00 to 9.50
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ten delivered consumers' yards:	
Selected heavy steel	\$9.25 to \$9.75
No. 1 heavy melting	9.00 to 9.50
No. 2 heavy melting	8.00 to 8.50
No. 1 locomotive tires	9.50 to 10.00
Misc. stand.-sec. rails	9.25 to 9.75
Railroad springs	11.00 to 11.50
Bundled sheets	7.75 to 8.25
No. 2 railroad wrought	9.00 to 9.50
No. 1 busheling	6.75 to 7.25
Cast iron borings and shoveling turnings	5.00 to 5.50
Rails for rolling	10.75 to 11.25
Machine shop turnings	5.50 to 5.50
Heavy turnings	6.00 to 6.50
Steel car axles	10.50 to 11.00
Iron car axles	13.00 to 13.50
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	12.00 to 12.50
Steel angle bars	9.75 to 10.25
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	9.75 to 10.25
No. 1 railroad cast	9.00 to 9.50
Store plate	6.50 to 7.00
Agric. malleable	9.00 to 9.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.00 to \$8.05
Scrap T rails	8.00 to 8.05
No. 2 steel	6.50 to 6.75
Breakable cast	6.75 to 7.00
Machine shop turnings	1.00 to 1.30
Bundled skeleton, long	6.00 to 6.25
Forge flashings	6.00 to 6.75
Blast furnace scrap	2.75 to 3.00
Shafting	11.00 to 11.50
Steel car axles	10.50 to 11.00
Wrought pipe	5.00 to 5.25
Cast iron borings, chemical	8.00 to 8.50
Store plate	6.50

Per gross ten delivered consumers' yards:	
Textile cast	\$8.75 to \$9.00
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.00 to \$9.50
No. 2 heavy melting steel	7.00 to 8.00
Heavy breakable cast	8.00 to 8.25
No. 1 machinery cast	8.50
No. 2 cast	7.00 to 7.50
Store plate	6.00
Steel car axles	10.75 to 11.50
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00

*Nominal.

Spec. iron and steel pipe	\$5.75 to \$6.00
Forge fire	5.50 to 6.00
Rails for rolling	9.50 to 10.00
Short shoveling turnings	3.00 to 4.00
Machine shop turnings	3.50 to 4.00
Cast borings	4.50 to 4.75
No. 1 blast furnace	2.50 to 4.00
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	5.00 to 5.50
Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$12.00
No. 1 hvy. cast (cupola size)	10.50
No. 2 cast	9.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$8.75 to \$9.50
Scrap rails for melting	9.50 to 10.00
Loose sheet clippings	5.25 to 5.75
Bundled sheets	7.00 to 7.50
Cast iron borings	6.50 to 7.00
Machine shop turnings	9.00 to 9.50
No. 1 busheling	7.50 to 8.00
No. 2 busheling	4.00 to 4.50
Rails for rolling	10.00 to 10.50
No. 1 locomotive tires	9.50 to 10.00
Short rails	12.25 to 12.75
Cast iron car wheels	8.75 to 9.25
No. 1 machinery cast	10.00 to 10.50
No. 1 railroad cast	9.50 to 10.00
Burnt cast	7.00 to 7.50
Store plate	7.00 to 7.50
Agricultural malleable	9.00 to 9.50
Railroad malleable	9.00 to 9.50

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$9.25 to \$9.75
Borings and short turnings	5.00 to 5.50
Long turnings	6.25 to 6.75
No. 1 machinery cast	10.75 to 11.25
Automotive cast	11.50 to 12.00
Hydraulic, comp. sheets	9.50 to 10.00
Store plate	8.00 to 8.50
New factory busheling	8.00 to 8.50
Old No. 2 busheling	5.50 to 6.00
Sheet clippings	7.75 to 8.25
Flashings	9.50 to 10.00
Low phos. plate scrap	9.50 to 10.00

CANADA

Dealers' buying prices per gross ton:	
	Toronto Montreal
Heavy melting steel	\$5.50 \$5.50
Rails, scrap	6.00 4.50
Machine shop turnings	2.50 2.50
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	2.00 2.00
Steel borings	2.50 2.50
Wrought pipe	2.50 2.50
Steel axles	4.50 6.00
Axles, wrought iron	4.50 6.00
No. 1 machinery cast	7.75 9.00
Store plate	4.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.	
Plates	2.85c
Structural shapes	3.05c
Soft steel bars and small shapes	2.85c
Reinforcing steel bars	3.00c
Cold-finished and screw stock	
Rounds and hexagons	3.45c
Squares and flats	3.45c
Hoops and bands, under 1/2 in.	3.15c
Hot-rolled annealed sheets (No. 24), 25 or more bundles	2.75c
Galv. sheets (No. 24), 25 or more bundles	2.75c
Hot-rolled sheets (No. 10)	2.85c
Galv. corrug. sheets (No. 24), per square (more than 3750 lb.)	\$3.32
Spikes, large	2.90c
Track bolts, all sizes, per 100 count	65 per cent off list
Machine bolts, 100 count	65 per cent off list
Carriage bolts, 100 count	65 per cent off list
Nuts, all styles, 100 count	65 per cent off list
Large rivets, base per 100 lb.	\$3.25
Wire, black, soft ann'l'd, base per 100 lb.	\$2.575c
Wire, galv. soft, base per 100 lb.	\$2.925c
Common wire nails, per keg	\$2.575c
Cement c'd nails, per keg	\$2.575c

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.	
Plate and structural shapes	2.10c
Soft steel bars	2.90c
Cold-fn. steel bars and shafting	3.40c
Rounds and hexagons	3.40c
Flats and squares	3.40c
Bands, 3/16 in. (in Nos. 10 and 12 gages)	3.20c
Hoops (No. 14 case and lighter)	3.20c
Hot-rolled annealed sheets (No. 24)	3.70c
Galv. sheets (No. 24)	4.30c
Hot-rolled sheets (No. 10)	2.85c
Spikes (9/16 in. and lighter)	3.50c
Track bolts	4.65c
Rivets, structural (keg lots)	3c
Rivets, boiler (keg lots)	3.10c
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head and cap screws	80
Cup point set screws	70
Flat head bright wood screws, 37 1/2 and 10	70
Spring cotters	75
Store bolts in full packages	75
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	\$3.75
Com. wire nails, base per keg	2.70c
Cement c'd nails, base per keg	2.70c

NEW YORK

Base per Lb.	
Plates	3.80c
Structural shapes	3.75c
Soft steel bars, small shapes	2.17c
Iron bars	3.24c
Iron bars, swed. charcoal	6.50 to 7.25c
Cold-fn. shafting and screw stock	
Rounds and hexagons	3.92c
Flats and squares	4.42c
Cold-rolled strip, soft and quarter hard	4.00c
Hoops	3.42c
Bands	3.42c
Hot-rolled sheets (No. 10)	3.17c
Hot-rolled ann'l'd sheets (No. 24)	3.65c
Galvanized sheets (No. 24)	4.25c
Long term sheets (No. 24)	5.00c
Standard tool steel	11.00c
Wire, black annealed (No. 10)	3.30c
Wire, galv. (No. 10)	3.80c

Tire steel, 1 x 1/2 in. and larger	3.50c
Open hearth spring steel	4.00c to 10.00c
Common wire nails, base, per keg	\$3.00
Off list	
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread	
Up to 1/2 in. dia. inclusive	60
Over 1/2 in. dia.	50
Boiler tubes	Per 100 ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	18.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	25.65

*No. 28 and lighter, 36 in. wide, 20c higher per 100 lb.

ST. LOUIS

Base per Lb.	
Plates and struc. shapes	2.40c
Bars, soft steel or iron	3.20c
Cold-fn. rounds, shafting, screw stock	3.74c
Hot-rolled annealed sheets (No. 24)	2.84c
Galv. sheets (No. 24)	4.54c
Hot-rolled sheets (No. 10)	3.44c
Black corrug. sheets (No. 24)	3.99c
Galv. corrug. sheets	4.59c
Structural rivets	3.84c
Boiler rivets	3.94c
Tank rivets, 7/16 in. and smaller	60
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, pivot bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
100 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50
*No. 28 and lighter take special prices.	

PHILADELPHIA

Base per Lb.	
*Plates, 1/2-in. and heavier	2.75c
*Structural shapes	2.75c
*Soft steel bars, small shapes, iron bars (except bands)	2.75c
*Reinforce steel bars, sq. twist and deformed	2.505c
*Cold-finished steel bars	3.73c
*Steel hoops	3.30c
*Steel bands, No. 12 to 3/16 in., incl.	3.05c
*Spring steel	5.00c
*Hot-rolled annealed sheets (No. 24)	3.80c
*Galvanized sheets (No. 24)	4.40c
*Hot-rolled annealed sheets (No. 10)	2.95c
*Diamond plat. floor plates, 1/4 in.	4.75c
*Swed. iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 50 bundles or over.
‡For 5 tons or more, exclusive of cutting charge.

CLEVELAND

Base per Lb.	
†Plates and struc. shapes	3.38c
†Soft steel bars	3.05c
†Reinforce steel bars	2.10c
†Cold-finished steel bars	3.40c
†Flat rolled steel under 1/4 in.	3.51c
Cold-finished strip	5.55c
Hot-rolled annealed sheets (No. 24)	3.76c
Galvanized sheets (No. 24)	4.36c
†Hot-rolled sheets (No. 10)	3.26c
†Black ann'l'd wire, per 100 lb.	\$2.65
†No. 9 galv. wire, per 100 lb.	3.00
†Com. wire nails, base per keg	2.40

†Effective April 27.
*Plus mill, size and quantity extras.

CINCINNATI

Base per Lb.	
Plates and struc. shapes	3.45c
Bars, soft steel or iron	3.25c

BUFFALO

Base per Lb.	
Plates	3.27c
Struc. shapes	3.18c
Soft steel bars	2.95c
Reinforcing bars	1.95c
Cold-fn. flats and sq.	3.55c
Rounds and hex.	3.55c
Cold-rolled strip steel	5.35c
Hot-rolled annealed sheets (No. 24)	2.85c
Heavy hot-rolled sheets, 3/16 in. to 48 in. wide	3.45c
Galv. sheets (No. 24)	4.45c
Bands	3.25c
Hoops	3.35c
Hot-rolled unannealed sheets	3.07c
Com. wire nails, base per keg	\$3.00
Black wire, base per 100 lb.	3.35

BOSTON

Per Lb.	
Beams, channels, angles, tees, zees	3.45c
H beams and shapes	2.45c
Plates—sheared, tank and univ. mill, 1/2 in. thick and heavier	3.45c
Floor plates, diamond pattern	5.15c
Bar and bar shapes (mild steel)	3.55c
Bands 3/16 in. thick and No. 12 ga. incl.	3

Cast Iron Pipe

Pelham, N. Y., has awarded 1060 tons of 2-in. and smaller pipe and fittings to United States Pipe & Foundry Co.

Pulaski, N. Y., has placed 500 tons of 12-in. pipe and fittings with R. D. Wood & Co.

Sharon Springs, N. Y., plans water pipe line. Fund of \$40,000 is being arranged, including other waterworks extensions.

Cameron, S. C., plans water pipe line system, including waterworks station. Fund of \$33,000 is being arranged. Ryan Engineering Co., Arcade Building, Columbia, S. C., is engineer.

Martins Ferry, Ohio, plans early purchase of 12-in. for water system.

Toledo, Ohio, has awarded 300 tons to James B. Clow & Sons.

Chicago has placed 200 tons for Sanitary District work with James B. Clow & Sons.

Chicago receives bids April 26 on eight 36-in. electrically operated gate valves.

Vienna, Ill., will take bids soon for water pipe line system, including waterworks station. Fund of \$60,000 has been secured through Federal aid. Warren & Van Praag, Milliken Building, Decatur, Ill., are engineers.

Footville, Wis., asks bids until May 8 for 12,521 ft. of 2, 4 and 6-in. for water system. W. G. Kirchoffer, Madison, Wis., is engineer.

Humble, Tex., asks bids until May 8 for 2, 6 and 8-in. for water system. Garrett Engineering Co., Houston, Tex., is consulting engineer.

American Cast Iron Pipe Co. has secured award for about 725 tons for water system at Pittsburg, Tex.

Port Lavaca, Tex., plans water pipe line. Fund of \$54,000 has been secured through Federal aid for this and waterworks station. J. C. McVea, 1318 Kipling Street, Houston, Tex., is consulting engineer.

Sayre, Okla., plans pipe line for extensions in water system, including new 300,000-gal. elevated steel tank and tower.

Fort Collins, Colo., has applied for a loan for improvements which include about 1600 tons of 16 and 20-in.

Arcadia, Cal., will take bids May 1 on 160 tons of 16-in.

San Francisco will take bids April 30 on 765 tons of 6-in.

Oakland, Cal., will take bids May 2 on 935 or 1025 tons of 4 to 12-in.

Greenwich Mutual Water Co., recently organized by J. F. Wadkins, 8942 Burton Way, Beverly Hills, Cal., and associates, plans purchase of 3-in. for water supply system for Greenwich Village, a new townsite about 25 miles from Ventura, Cal. Charles P. Martin, 426 South Palm Drive, Beverly Hills, is interested in new company.

Pipe Lines

Billings Gas Co., 105 North Twenty-seventh Street, Billings, Mont., has authorized new 12 3/4-in. welded steel pipe line from Billings to point near Yellowstone River, vicinity of Laurel, Mont., about 14 miles, for main trunk line, replacing present 10-in. pipe. Replacements will also be made in steel pipe line from Yellowstone River to Elk Basin oil field district, increasing size, as well as extensions and improvements in gas distribution lines at Billings and Laurel. Cost over \$200,000. J. E. Moore is general manager.

Boulder, Colo., has low bid from Swartz Construction Co., Colorado Springs, Colo., at \$10,125, for about 10,000 ft. of 16-in. steel pipe line for water trunk line.

Guthrie Gas Utility Co., Guthrie, Okla., recently organized, has acquired local gas pipe line system of Western Service Corp., and plans extensions and improvements.

Northern Natural Gas Co., an interest of United Light & Power Co., 105 West Adams Street, and North American Light & Power Co., 231 South LaSalle Street, both Chicago, are closing agreement with Minneapolis Gas Light Co., Minneapolis, to furnish natural gas for local consumption, and plan pipe line ex-

tensions for new service. Minneapolis company plans new station for mixing and distributing natural and artificial gas.

Republic Steel Corp., Youngstown, Ohio, has secured Federal award for steel pipe for temporary water system, Fort Peck construction camp, Fort Peck, Mont.

State of Utah has awarded 140 tons of steel pipe for Agricultural College to Crane Co., and N. O. Nelson Co.

Railroad Equipment

United States Navy Department has ordered two 300-hp. Diesel locomotives from American Locomotive Co., for service at Mare Island, Navy Yard.

Central of Georgia is inquiring for 200 70-ton hopper cars.

Seaboard Air Line is inquiring for 10 box car underframes.

Donner-Hanna Coke Corp., has awarded contract to Pressed Steel Car Co. for repairing 100 steel hopper cars.

Carnegie Steel Co. has awarded contract to Canton Car Co. for repairing 31 hopper cars.

Gulf, Mobile & Northern has ordered 100 box cars, and parts for 50 box and 50 gondola cars from American Car & Foundry Co.

Boston & Maine has purchased air-conditioning equipment for 13 cars from B. F. Sturtevant Co.

RAILS

Canadian Pacific has ordered 21,000 tons of rails from Algoma Steel Corp., and 4000 tons from Dominion Steel & Coal Corp.

THEY ALL SAY ...



"The new

WYCKOFF STEEL CHART

*sure saves a lot of hunting and
figuring"*

Whether your steel problem involves a question of Machinability . . . Cold Forming . . . Carbonizing . . . Machining and Hardening . . . Heat-Treating for Strength or Hardness . . . You will find the key to its solution in this new steel chart.

Also shown is a complete table of weights per lineal foot of all standard sizes and shapes . . . SAE specifications on Automotive Steels . . . as well as complete Metallurgical Conversion Tables. If you have not received your copy, —write now.

WYCKOFF DRAWN STEEL COMPANY

GENERAL OFFICES: Ambridge, Pa.

MILLS at Ambridge, Pa. and Chicago, Ill.

Manufacturers of
COLD DRAWN STEELS

Turned and Polished Shafting, Turned and Ground Shafting

Metals Prices Remain Steady Despite Continued Disinterest Among Consumers

Signing of Copper Code Has No Effect on Electrolytic Price;
Tin Inactive—Zinc Sales Total 3900 Tons—Lead Quiet

NEW YORK, April 24.—Climaxing over seven months' wrangling, the Code of Fair Practices and Competition for the copper industry was formally signed by Administrator Johnson last Saturday. The provisions will become effective April 26, and the sales quotas are retroactive in that all bookings made since March 22 will be included in the quota distributions established by the code. The Government sponsored code imposes on the industry a central authority to govern all sales of copper, to define sales plans for the orderly liquidation of the large stocks now on hand, and to police the industry for possible abuses of marketing provisions. Mine and secondary producers have been allocated monthly tonnages, and sales quotas for the entire industry are being determined. No primary producer is permitted a tonnage even approximating its potential capacity, but this action is justified in view of the large

volume of metal now above ground. Discounting normal mill inventories, the 450,000 tons of free stocks on hand could supply all consuming demands for over a year if all production, both secondary and primary, were to cease.

The present market for electrolytic copper is quiet with no open reaction to the code acceptance. The price is steady at 8.50c., delivered Connecticut Valley, and the trade does not expect any firm rise in the near future. Foreign traders entered several commitments today at 8.35c., c.i.f., Liverpool and Havre, but in general the situation abroad continues quiet in sympathy with the inactivity here.

Tin

New York prices advanced with London during the week, and Straits and English brands were nominally available this morning at 55.90c. a lb. The present market here is practically

inactive despite the possibility that even higher prices will be asked in the near future. First call postings today in London established spot and future standard at £240 10s. and £238 2s. 6d. respectively, and £239 2s. 6d. for Straits at Singapore. No increase of quotas was sanctioned by the International Tin Committee in its recent meeting. Therefore, for the time being, the trade looks for shrinking supplies and somewhat higher prices. The committee, however, recommended acceptance of the buffer pool despite the opposition of several signatories and the wholehearted disapproval of consumers. The buffer scheme purportedly is to discourage speculation, but observers contend that its operation will mean even higher average market prices.

Zinc

Selling pressure brought by previous dullness was responsible for offerings five points down late last week, but the market gained strength both yesterday and today. Spelter is now available into June at 4.40c. a lb., East St. Louis, although prompt metal can be had in good quantities from most sellers at 4.37½c. Galvanizing demand is considerably improved, but aggregate consumer inquiry is not particularly large despite the attractive price measured in terms of conversion costs of smelters and the firm position of Tri-State concentrates. Sales last week of prompt and July Prime Western totaled about 3900 tons at prices ranging from 4.32½c. to 4.40c., as compared with 2700 tons in the preceding period, and 9500 tons booked a fortnight ago. The future trend of spelter prices is problematical, although the market seems to be seeking a 4.40c. position. Any steady price lower is doubtful as long as Joplin concentrates are priced around \$30 a ton. The ore market continues to be firm at \$29 and \$30 for flotations and mill grades of concentrates respectively, and purchases last week rose to 4950 tons. Output advanced slightly to 6400 tons, shipments totaled 6200 tons, and visible bin stocks were estimated at 15,250 tons at the end of the week.

Lead

Principal producers are not particularly concerned about the poor March statistics recently released as they are satisfied that the trend of business is upward. Consumers are currently showing no desire to buy heavily against May requirements, but only 16,000 tons have been sold for that month, and it is, therefore, apparent that an additional 15,000 tons must come into the market within the next few weeks. Aggregate sales during the past few days have been only moderate in size, but the price has shown no weakness at the 4.10c. a lb., St. Louis, level.

The Week's Prices. Cents Per Pound for Early Delivery

	April 18	April 19	April 20	April 21	April 23	April 24
Electrolytic copper, N. Y.*	8.25	8.25	8.25	8.25	8.25	8.25
Lake copper, N. Y.	8.50	8.50	8.50	8.50	8.50	8.50
Straits tin, Spot, N. Y.	55.45	55.25	56.12½	—	56.12½	55.90
Zinc, East St. Louis	4.35	4.35	4.35	4.35	4.37½	4.37½
Zinc, New York	4.70	4.70	4.70	4.70	4.72½	4.72½
Lead, St. Louis	4.10	4.10	4.10	4.10	4.10	4.10
Lead, New York	4.25	4.25	4.25	4.25	4.25	4.25

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb. delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 15.50c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 7.95c. a lb., New York.
Brass ingots, 85-5-5-5; 8.75c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.	57.00c. to 58.00c.
Tin, bar.	59.00c. to 60.00c.
Copper, Lake.	9.75c. to 10.50c.
Copper, electrolytic.	9.50c. to 10.00c.
Copper, castings.	9.25c. to 10.25c.
*Copper sheets, hot-rolled	15.50c.
*High brass sheets.	14.25c.
*Seamless brass tubes.	16.75c.
*Seamless copper tubes.	16.75c.
*Brass rods.	12.75c.
Zinc slabs.	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig.	5.00c. to 6.00c.
Lead, bar.	6.00c. to 7.00c.
Lead, sheets.	8.00c.
Antimony, Asiatic.	9.25c.
Alum., virgin, 99 per cent, plus.	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent.	18.00c. to 19.00c.
Solder, ½ and ⅓.	33.00c. to 34.00c.
Babbitt metal, commercial grades.	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.	59.75c.
Tin, bar.	61.75c.

Copper, Lake.	9.50c.
Copper, electrolytic.	9.50c.
Copper, castings.	9.25c.
Zinc, slab.	5.75c. to 6.00c.
Lead, American pig.	5.10c. to 5.35c.
Lead, bar.	8.00c.
Antimony, Asiatic.	9.00c.
Babbitt metal, medium grade.	19.50c.
Babbitt metal, high grade.	64.00c.
Solder, ½ and ⅓.	36.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.	6.75c.	7.50c.
Copper, hvy. and wire	6.50c.	7.25c.
Copper, light and bottoms	5.50c.	6.50c.
Brass, heavy.	3.62½c.	4.37½c.
Brass, light.	3.12½c.	3.75c.
Hvy. machine composition	5.25c.	6.125c.
No. 1 yel. brass turnings	4.50c.	5.25c.
No. 1 red brass or compos. turnings	4.37½c.	5.37½c.
Lead, heavy.	3.25c.	3.75c.
Zinc	2.50c.	3.125c.
Cast aluminum	10.00c.	11.75c.
Sheet aluminum	12.25c.	13.50c.

Reinforcing Steel

Awards 3055 Tons—New Projects
4000 Tons

AWARDS

Camden, N. J., 1100 tons, first section of New Jersey approach to the Delaware River bridge, to Concrete Steel Co.

Newburyport, Mass., 175 tons, highway bridge and approaches, to Truscon Steel Co.

Reading, Pa., 350 tons, Maiden Creek reservoir, to Kalman Steel Corp.

State of Ohio, 315 tons, culverts at North Olmstead, 200 tons to Truscon Steel Co., 115 tons to Patterson-Leitch Co.

Terre Haute, Ind., 100 tons, Normal School, to Hugh J. Baker & Co.

Muncie, Ind., 100 tons, Teachers' College, to Hugh J. Baker & Co.

Mohave County, Ariz., 120 tons, State paving, to Soule Steel Co.

Los Angeles, 120 tons, city overhead crossing, to Pacific Coast Steel Corp.

Los Angeles County, Cal., 405 tons, State bridge on Sunset Boulevard, to Graham Brothers.

Los Angeles County, 135 tons, State paving, to Pacific Coast Steel Corp.

Los Angeles County, 135 tons, structures on N Street, to Los Angeles Iron & Steel Co.

Reading, Pa., 350 tons, tunnel for Main Creek water system, to Kalman Steel Corp.

NEW REINFORCING BAR PROJECTS

Rock Island, Ill., 100 tons, Augusta College; Lind Construction Co., Chicago, low bidder.

Chicago, 1300 tons, project Nos. 6 and 13 for Sanitary District; S. A. Healy, low bidder on general contract.

Lafayette, Ind., 100 tons, Woman's Building at Purdue University.

Springfield, Ill., 100 tons, laboratory for State of Illinois.

St. Louis, 120 tons, office building for Monsanto Chemical Works.

Boulder Dam, 200 tons, No. 23,119-A; bids under advisement.

Long Beach, Cal., 1305 tons, city retaining walls, no date for bids set.

Tucson, Ariz., 155 tons, State undercrossing, bids opened.

Newport, Ore., 925 tons additional, State bridge over Yaquina Bay; bids open May 17.

Fort Peck, Mont., 3230 tons, tunnels. Silas Mason Co., general contractor.

Scrap Off at Detroit

DETROIT, April 24.—Scrap prices continue to give ground as production of old material greatly exceeds the demand. Most items are off 25c. to 50c. a ton. The local mill has large stocks of scrap on hand and therefore is taking in tonnage sparingly.

The Republic Coal & Coke Co., 28 East Jackson Boulevard, Chicago, has been appointed exclusive selling agents for the Indiana Consumer Gas and By-Product Co.'s Terre Haute special foundry coke. Branch offices are maintained at Indianapolis, Milwaukee, Minneapolis, Peoria, Ill., and Detroit.

BUNDYWELD STEEL TUBING

Resists Vibration

Because of its ability to withstand vibration, its great strength, and recuperative properties, Bundyweld Tubing has been proven superior for such installations as gas, oil, brake, and vacuum lines. It has the strength of steel with sufficient ductility to permit easy fabrication.

Bundyweld Steel Tubing is rolled from strip steel which has been previously copper-coated on two sides, and is then Copper-Hydrogen-Welded into a solid structure.

The reducing atmosphere of the welding process leaves the tube absolutely clean and free from scale. It may be heat-treated without injury.

Both I. D. and O. D. are held to tolerances of .003". Uniformity of wall thickness is an outstanding feature. Bundyweld tubing is furnished in base sizes of $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", and $\frac{5}{8}$ " in various wall thicknesses. It can be redrawn to any odd size required. Furnished in lengths of completely fabricated, either with or without fittings. Send blue prints or samples for quotations. Complete information upon request.

BUNDY TUBING CO.

DETROIT

Fabricated Structural Steel

Awards Gain—New Projects in Large Volume

LETTINGS of 21,420 tons compare with 13,650 tons last week and were swelled by 8000 tons for plates and structural work at Fort Peck, Mont. Other awards include 1350 tons for a bridge at Joslin, Ill., and 1220 tons for a bridge at Naheola, Ala., for the Meridian and Bigbee River Railroad. New projects of 49,100 tons are the largest since last August and are mostly for bridges in the Central and Southwestern States. Plate awards, not including those for Fort Peck, total 1370 tons. Sheet piling awards were 1100 tons. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

Newburyport, Mass., 190 tons, bridge, to Boston Bridge Works.

Monson, Mass., 110 tons, State hospital, warehouse, to G. Haarmann & Co.

Trenton, N. J., 265 tons, State tuberculosis hospital, to N. A. K. Bugbee Co., previously reported to McClintic-Marshall Corp.

Whippany, N. J., 225 tons, Agar Mfr. Co. building, to Lehigh Structural Steel Co.

New York, 120 tons, Broadway and Pearl Street building, to George A. Just Co.

Queens County, N. Y., 165 tons, State highway bridge, to American Bridge Co.

Juniata, Pa., 115 tons, housing development, to Bethlehem Fabricators, Inc.

Buffalo, 250 tons, school No. 37, to a local bidder.

Charlotte, N. Y., 300 tons, sheet piling, to a Buffalo bidder.

Lycoming County, Pa., 250 tons, highway bridge, to Lackawanna Steel Construction Corp.

Washington, 670 tons, high school, to Barber & Ross.

Washington, 355 tons, Government warehouse, to McClintic-Marshall Corp.

SOUTH AND SOUTHWEST

Rutherford County, Tenn., 140 tons, highway bridge, to Nashville Bridge Co.

Tennessee Valley Authority, 160 tons, trestle and anchors for cableway, to St. Louis Structural Steel Co.

Tennessee Valley Authority, 125 tons, cement silos, to Stupp Brothers Bridge & Iron Co.

Naheola, Ala., 1220 tons, bridge for Meridian & Bigbee Railroad, to Virginia Bridge & Iron Co.

Washington County, Miss., 105 tons, bridge, to Jones & Laughlin Steel Co.

Benton County, Miss., 225 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Bowie and Harris Counties, Tex., 220 tons, bridges, to Virginia Bridge & Iron Co., Inc.

Tarrant County, Tex., 415 tons, bridges, to Central Texas Iron Works.

Ellis and Nolan Counties, Tex., 305 tons, bridges, to North Texas Iron & Steel Co.

Wichita County, Tex., 220 tons, bridge, to American Bridge Co.

Round Rock, Tex., 150 tons, bridge, to Virginia Bridge & Iron Co.

Amarillo, Tex., 150 tons, State highway department grade separation, to American Bridge Co.

High Island, Tex., 210 tons, State highway bridge, to Petroleum Iron Works.

Osage County, Okla., 140 tons, highway bridge, to Capitol Steel & Iron Co.

CENTRAL STATES

Midland, Mich., 500 tons sheet piling, dock for Dow Chemical Co., to Inland Steel Co.

Detroit, 550 tons, coal handling bridge, to R. C. Mahon & Co.

Fairfield, Ohio, 135 tons, officers quarters, to Jones & Laughlin Steel Co.

East Peoria, Ill., 950 tons, State viaduct, to American Bridge.

Williamson County, Ill., 135 tons, bridge, to Vincennes Bridge Co.

Sunset, Ill., 175 tons, highway bridge, to Worden-Allen Co.

Joslin, Ill., 1350 tons, bridge, to American Bridge Co.

East Peoria, Ill., 950 tons, bridge, to American Bridge Co.

East Chicago, Ind., 300 tons, sheet piling for Texas Corp., to Inland Steel Co.

Chicago, 110 tons, South Lagoon pavilion, Century of Progress, to Vierling Steel Works.

Chicago, 100 tons, railroad work, to Vierling Steel Works.

Hebron, Ind., 235 tons, Kankakee River bridge, to Midland Structural Steel Co.

Austin, Ind., 650 tons, American Can Co. building, to American Bridge Co.

State of Minnesota, 300 tons, highway bridges, to Minneapolis-Moline Power & Implement Co.

State of Iowa, 420 tons, highway bridges; 250 tons to Des Moines Steel Co., and 170 tons to McClintic-Marshall Corp.

WESTERN STATES

Los Angeles, 140 tons, viaduct widening, to Kyle Steel Construction Co.

Fort Peck, Mont., 8800 tons, structural and plate work, to American Bridge Co.

San Francisco, 500 tons, pier No. 3, to Ingalls Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Gilbertville, Me., 300 tons, State bridge.

Lewiston, Me., 285 tons, church.

Dover, N. H., 200 tons, State bridge.

Fairfield Benton, Me., 560 tons, Kennebec River bridge.

Saratoga Springs, N. Y., 260 tons, bath houses.

Troy, N. Y., 300 tons, Rensselaer Polytechnic Institute laboratory.

Washington, 250 tons, Howard University power house.

Chemung, N. Y., 100 tons, grade crossing elimination bridge.

Fillmore, N. Y., 120 tons, grade crossing elimination bridge.

SOUTH AND SOUTHWEST

Winner, Va., 800 tons, bridge.

Langley Field, Va., 700 tons, Government highway bridges.

State of Louisiana, 1270 tons, highway bridges over Boeuf River in Caldwell County and Ouachita River at Columbia.

Winnsboro, La., 800 tons, bridge.

Houston, Tex., 1100 tons, Humble building.

Dallas, Tex., 675 tons, bridge.

Beaumont, Tex., 2000 tons, oil derricks.

Claremore, Okla., 1000 tons, bridge.

Parcell, Okla., 1000 tons, bridge.

Camargo, Okla., 800 tons, bridge.

Eufaula, Okla., 1300 tons, bridge.

Sallisaw, Okla., 1300 tons, bridge.

Shawnee, Okla., 800 tons, bridge.

Oklahoma City, Okla., 800 tons, bridge.

Konowa, Okla., 1500 tons, bridge.

Van Buren, Ark., 400 tons, bridge.

Eldorado, Ark., 600 tons, bridge.

CENTRAL STATES

Kalamazoo, Mich., 300 tons, State highway department grade elimination.

State of Illinois, 895 tons, highway bridges.

Chicago, 300 tons, Cermak pumping station.

Golf, Ill., 550 tons, overhead crossing.

Hammond, Ind., 560 tons, sheet piling for packet freight terminal and water filter plant; Mackie, Thompson & Tam, low bidders on general contract.

State of South Dakota, 450 tons, bridges.

Richland, Mo., 400 tons, bridge.

Poplar Bluff, Mo., 600 tons, bridge.

Wayland, Mo., 800 tons, bridge.

Versailles, Mo., 2000 tons, bridge.

Missouri Pacific Railroad, 2000 tons, bridge projects.

Kansas City, Mo., 1200 tons, bridge.

Hannibal, Mo., 4000 tons, bridge.

Washington, Mo., 3800 tons, bridge.

Bagnell, Mo., 6000 tons, bridge.

Atcheson, Kan., 4000 tons, bridge.

WESTERN STATES

Wyola, Mont., 1200 tons, bridge.

State of Colorado, 105 tons, highway work in four counties; bids under advisement.

Fort Peck, Mont., 2946 tons, tunnels, Silas Mason Co., general contractor.

Seattle, 200 tons, library at University of Washington; bids under advisement.

Newport, Ore., 185 tons additional, State bridge over Yaquina Bay; bids May 17.

Juneau, Alaska, 855 tons, for Department of Interior.

FABRICATED PLATE

AWARDS

Memphis, Tenn., 220 tons, dredge and pipe pontoons to United Welding Co. and Chicago Bridge & Iron Co.

Houston, Tex., 280 tons, oil tank, to Wyatt Metal & Boiler Works.

Houston, Tex., 270 tons, tank for Crown Central Petroleum Co., to Wyatt Metal & Boiler Works.

Milwaukee, 500 tons, tanks for Barnsdall Oil Co., to Chicago Steel Tank Co.

State of Missouri, 100 tons, oil storage tanks, to Standard Steel Works, Kansas City.

NEW PROJECTS

Crede, Colo., 1300 tons, pipe line; bids to be opened April 28 at Denver.

Prices Advanced On Miscellaneous Items

The American Iron and Steel Institute has announced new minimum base price filings on electrical sheets, corrugated painted roofing and siding and a number of other special products. These are as follows:

Product	Base Price Per 100 lb.
Electrical sheets, base Pittsburgh, all effective April 29	
Armature grade, No. 28 gage . . .	\$3.40
Armature B grade, No. 28 gage . .	3.30
Field grade, No. 28 gage	3.05
Electrical grade, No. 28 gage . . .	3.90
Electrical disposal grade, No. 28 gage	3.30
Motor special grade, No. 28 gage . .	4.95
Motor special disposal grade, No. 28 gage	4.00
Dynamo special grade, No. 28 gage .	5.65
Dynamo special disposal grade, No. 28 gage	4.50
Transformer grade, No. 28 gage . . .	6.15
Transformer disposal grade, No. 28 gage	5.00
Transformer special grade, No. 28 gage	7.15
Transformer special disposal grade, No. 28 gage	5.00
Transformer extra special grade, No. 28 gage	7.65
Transformer extra special disposal grade, No. 28 gage	5.00
Electrical sheets, base Gary, all effective April 28	
Armature grade, No. 28 gage	\$3.74
Armature B grade, No. 28 gage . . .	3.64
Electrical grade, No. 28 gage	4.24
Electrical disposal grade, No. 28 gage	3.34
Field grade, No. 28 gage	3.39
Transformer grade, No. 28 gage . . .	6.49
Transformer special grade, No. 28 gage	7.49
Transformer extra special grade, No. 28 gage	7.99
Motor special grade, No. 28 gage . .	5.29
Dynamo special grade, No. 28 gage .	5.99
Base Price Per Square	
2 in. 2½ in. and 3 in. corrugated	
Painted roofing and siding, base Gary, effective April 30	
No. 28 gage	\$2.24
No. 26 gage	2.58
No. 24 gage	3.27
No. 22 gage	4.01
No. 20 gage	4.72
No. 18 gage	6.04
Galvanized 2 in. 2½ in. and 3 in. Corrugated, base Gary, effective April 30*	
No. 29 gage	3.19
No. 28 gage	3.27
No. 26 gage	3.57
No. 24 gage	4.25
No. 22 gage	5.05
No. 20 gage	5.87
No. 18 gage	7.54
No. 16 gage	9.00
No. 14 gage	10.94
No. 12 gage	14.64
No. 10 gage	18.06
No. 27 gage	3.41

*Except Nos. 10, 12, 14 and 27 gage which were effective April 18.

Product	Base Price Per Net Ton
V-mesh fence, Anderson, Ind., effective April 27	
Base, spec. "E"	\$75.85
Diamond lawn fence	
Base, spec. "I"	82.00
Low carbon spring wire	Base Price Per 100 lb.
Annealed stone wire	\$2.35
Galvanized stone wire	4.55
Pure iron copper alloy, long ternes, base Gary, effective May 1	5.55
Hot-rolled strip rail steel, base Chicago, effective April 29	4.29
	1.68

Navy Department Awards Steel

WASHINGTON, April 24.—The Navy Department has formally awarded 5103 tons of steel plates,

2451 tons of shapes and 304 tons of steel bars for seven Coast Guard cutters. Shape tonnage was distributed as follows: Bethlehem Steel Co., 964 tons; John P. Hill, 529 tons; Joseph T. Ryerson & Son, 333 tons; Penn Galvanizing Co., 406 tons; Carnegie Steel Co., 196 tons; Jones & Laughlin Steel Corp., 18 tons, and Enterprise Galvanizing Co., 7 tons.

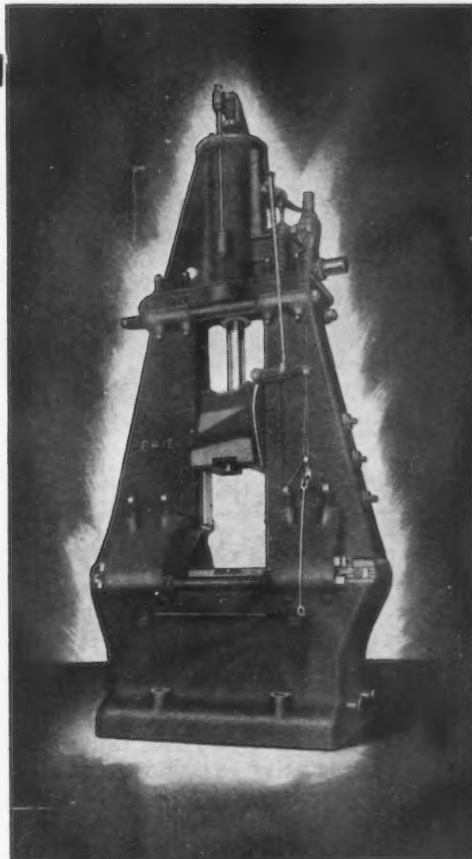
The steel bar tonnage was awarded as follows: Carnegie Steel Co., 140 tons; Sharon Steel Hoop Co., 40 tons; Bethlehem Steel Co., 40 tons, and Joseph P. Cattie & Bros., 84 tons.

The plates were distributed as fol-

lows: Penn Galvanizing Co., 1120 tons; J. P. Cattie & Bros., 1000 tons; Jones & Laughlin Steel Corp., 950 tons; Alan Wood Steel Co., 834 tons; Carnegie Steel Co., 500 tons; Central Iron & Steel Co., 347 tons, and Joseph T. Ryerson & Son, 262 tons.

Other navy awards of steel include the following: Superior Steel Corp., 960 tons of sheets; Central Iron & Steel Co., 750 tons of floor and medium black plate; American Rolling Mill Co., 50 tons of floor and medium black plate; Jones & Laughlin Steel Corp., 420 tons of shapes, and Enterprise Galvanizing Co., 42 tons of shapes.

ROBBING PETER TO PAY PAUL



As a temporary expedient it may have been wise to strip one hammer of parts, to keep others running. But the inevitable day of reckoning is here, and you need your *full* productive capacity to serve your customers well. Don't have orders taken away because you fall down on deliveries. Bring your stock of spare parts up to normal. Remember, emergency service on repairs is more difficult under code restrictions.

Are your hammers running well enough to enable you to show a profit? Shops can, that are equipped with modernized Erie Steam Drop Hammers and Erie Board Drop Hammers. Bring your shop up to date, and operate profitably at competitive prices.

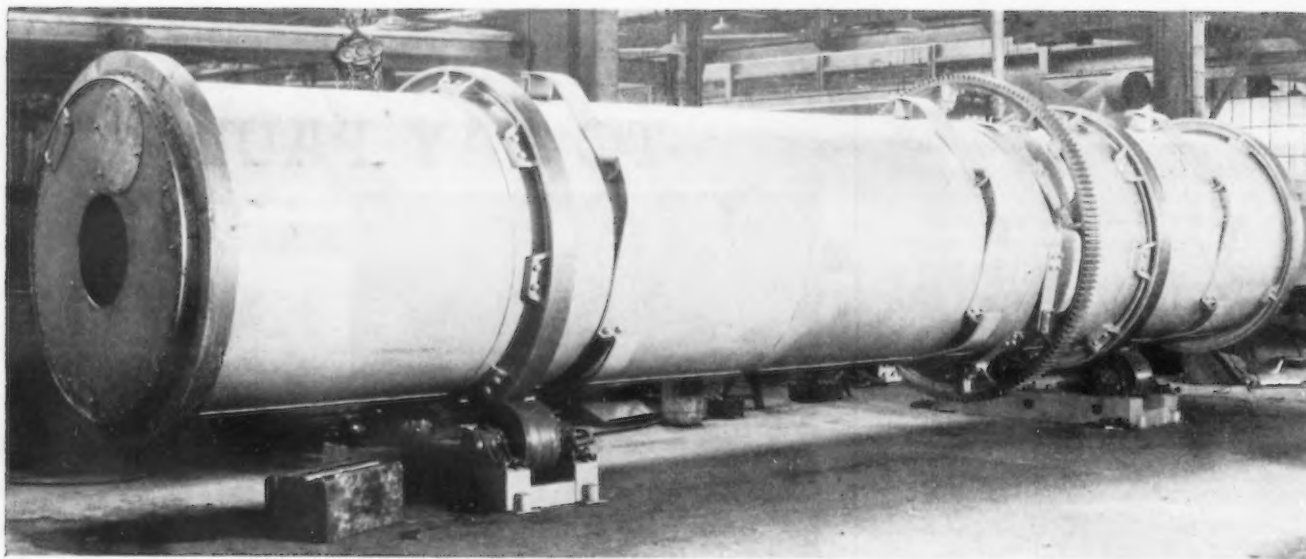
ERIE FOUNDRY COMPANY ERIE, PENNA., U. S. A.

DETROIT:
CHICAGO:

335 CURTIS BUILDING
549 WASHINGTON BLVD.

INDIANAPOLIS: 335 POSTAL STATION BUILDING
PARIS, FRANCE: 8 RUE DE ROCROY

ERIE



Large Stainless Clad Steel Plates Used in Construction of Rotary Dryer

SOME of the largest stainless clad steel plates ever produced in this country entered into the fabrication of the 72-in. diameter, 35-ft. long rotary dryer built recently by the C. O. Bartlett & Snow Co., Cleveland. The plates were produced by the Ingersoll Steel & Disc Co., Chicago. Eight of them were used, four 4 ft. 8½ in. wide, ¼ in. thick and 20 ft. long, and four of the same width and thickness but 15 ft. long. The 18-8 stainless cladding was approximately 0.050 in. thick. The plates were rolled to form a cylinder with the stainless surface on the inside.

The joints were made by arc welding. At the transverse and longitudinal joints the mild steel exterior portion of each plate was welded together with Babcock & Wilcox flux-coated electrode and reinforced with a mild-steel butt strap, also welded with this rod. The stainless cladding was connected at the joints by electric welding, using Page coated steel welding rod of 24 per cent chrome, 12 per cent nickel alloy.

End retainer plates were solid 18-8 stainless steel produced by the Allegheny Steel Co. They were secured by 18-8 stainless steel angle rings and 18-8 stainless rivets driven hot. The discharge end retainer plate was fitted with several removable door plates, secured with 18-8 stainless steel bolts and nuts.

The cast iron sealing rings at each end of the dryer, where the cylinder entered the breechings, were protected by Ingersoll stainless clad plates, electrically welded together and secured to stainless angle rings with stainless rivets. To insure that no ordinary steel surface contacted

the wet or dry material processed, the mild steel exterior of the cylinder was covered with a strip of 18-8 stainless sheet, the edges of which were swedged over the ends of the cylinder plates and joined to the stainless cladding by electric welding.

Seal rings, riding rings, girt gear and rapping cams were secured to the cylinder by 18-8 stainless steel bolts furnished by the Republic Steel Corp., which also supplied the 18-8 stainless rivets.

Rotary Cooler Made of Aluminum Alloy Plates

With the dryer was supplied a rotary cooler, 60 in. in diameter and 30 ft. long. The cooler was made of heat-treated aluminum alloy plates, Aluminum Co. of America's grade 51 ST. The plates were ¼ in. thick. Joints were made by external No. 51 ST aluminum alloy butt straps secured by aluminum alloy rivets. The inside of the cooler was fitted with lifting flights formed of No. 51 SO aluminum alloy and subsequently heat treated before being riveted in place.

The retaining ring of the cooler is of 51 ST aluminum alloy plate, riveted to a No. 3 S-4 aluminum angle ring. The seal rings were shielded with electrically welded No. 3 S-4 aluminum plates secured to end angle rings by aluminum alloy rivets.

The breechings of both dryer and cooler were made entirely of 18-8 stainless steel furnished by Allegheny Steel Co. All joints were made by arc welding. The seal fabric which closed the opening between the rotating seal ring on the end of the dryer

or cooler cylinder and the breeching face was specially treated, very flexible asbestos brake lining produced for this particular service by the Southern Asbestos Co. of Charlotte, N. C. Because of the nature of the stock being dried and cooled, the ordinary interwoven brass wire insertion could not be employed, so pure nickel was used instead.

Both dryer and cooler are driven by individual electric motors, through Falk flexible couplings and Falk herringbone gear reducers. The driving pinions meshing with the girt gears were mounted on the slow-speed shafts of the reducers, the shafts being extended and supported beyond the pinions in Falk ring-oiling outboard bearings.

The dryer, cooler and breeching equipment was so made that no surface was exposed to the stock being processed except stainless steel or aluminum alloy, thus insuring a dried stock of the highest chemical purity. Stainless steel was chosen for the dryer and breechings because of its high resistance both to corrosion and abrasion. The aluminum alloy of the cooler had practically the same surface hardness as steel, resisted both abrasion and corrosion, and at the same time by its high heat conductivity increased the cooling effect.

STEPHENS-ADAMSON MFG. CO., manufacturers of conveyors, Aurora, Ill., has reopened sales-engineering offices at Pittsburgh, and Huntington, W. Va. The Pittsburgh office, at 1206 Gulf Building, is under supervision of Harry W. Banbury, who has long been associated with the company as purchasing agent and special sales engineer. Huntington sales and engineering will be handled by D. W. Allen, a tipple and conveyor specialist with years of experience in the West Virginia district.

Copper Industry Code Allocates Sales Quotas

APPROVAL of a Code of Fair Competition for the copper industry, probably solving one of the most difficult problems which has faced the Administration and climaxing nearly seven months of almost continuous negotiations, has been announced by National Recovery Administrator Hugh S. Johnson. This Code will become effective on April 26.

The code establishes a 40-hour maximum work week, averaged over a three months period, throughout the industry with exceptions for employees engaged in emergency maintenance or emergency repair work, outside salesmen, managerial executive, technical, engineering or supervisory employees receiving over \$35 weekly, and hoistmen, powerhousemen and pumpmen.

Minimum wages for the various districts in the industry are established as follows:

- (a) Great Lakes Wage District—
Surface labor 32½c. per hr.
Underground labor... 37½c. " "
- (b) Northeastern Wage District—
Surface labor 37½c. " "
- (c) Southeastern Wage District—
Surface labor 35c. " "
- (d) Southwestern Wage District—
Surface labor 30c. " "
Underground labor... 40c. " "
- (e) Northwestern Wage District—
Surface labor 40c. " "
Underground labor... 47½c. " "

Exceptions to the above schedules are that minimum wage rates in effect in any district on March 1, 1934, above those now specified for that district shall in no case be reduced and that the underground rate in the Ray District of Arizona shall be not less than 38c. an hr.

Clerical and office employees as well as sales or service employees are to receive not less than \$18 weekly.

In his letter to President Roosevelt, reporting approval of the code, Administrator Johnson pointed out that the industry faces a situation in which if all the copper mines in the country were to be shut completely down for eighteen months the available stocks of the metal now above ground would be ample to supply all estimated needs for the period.

Additional disturbing factors are greatly reduced consumption and the development of large copper deposits in Africa which with that already produced in Canada and South America is produced at low labor costs that American producers cannot meet.

"The industry," the Administrator reported to the President, "faced with these problems of excessive stocks, low consumption and a depressed price, has endeavored ever since the passage of the National Industrial Recovery Act, to work out a code that would offer a solution of their difficulties. The industry was unable to agree on a



TOOL STEEL TUBING

NON-SHRINK
OIL HARDENING
NON-DEFORMING

for RING DIES
CUTTING DIES
SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO Tungsten Carbide
drawing dies for wire, rod and tubing.

THE BISSETT STEEL CO., INC.

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Buffalo

plan and finally submitted a code covering only the labor, administrative, and mandatory provisions, with the permissive right to submit to the Administration at a later date a plan agreeable to all members to cover problems of production, sales and price.

"The National Recovery Administration felt, however, that in view of the necessity of maintaining employment, and to provide for an orderly recovery through regular purchases of copper and the freezing of immediate stocks, a plan should be provided and made effective immediately to accomplish this end.

"There is therefore, included in the Administrative Order of Approval a plan which it is believed will accomplish this and the industry has indicated a willingness to cooperate in making this effective."

Under the plan written into the code by the Administrator's order, an allocation of 20,500 tons a month with sales quotas for each primary producer in the industry.

	Monthly Per- centage	Tons Per Annum	Sales Quotas
Kennecott Copper Corpn.	366,500	1.67%	
Anaconda Copper Mining Company	225,000	1.67%	
Phelps Dodge Corpn.	168,000	1.67%	
United Verde Copper Co.	68,000	1.90%	
Calumet & Hecla Con- solidated Copper Co.	50,000	2.20%	
Miami Copper Co.	36,000	2.30%	
Magna Copper Co.	25,000	2.50%	
United Verde Extension Mining Co.	24,000	2.50%	
Consolidated Copper Mines Co.	21,000	2.70%	
Copper Range Co.	17,500	3.00%	

In addition to the above 9500 tons a month will be allocated to secondary

producers by some equitable method to be determined by the Code Authority. Producers of custom and by-product copper may apply to the Code Authority for a sales quota and temporarily will have a quota of 50 per cent of their current production.

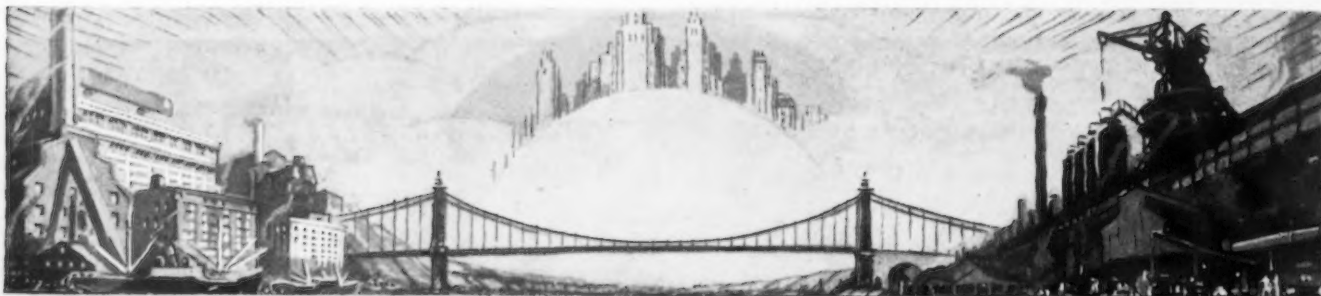
Thermit Welding Quickly Restores Service

(Concluded from Page 17)

crew under the supervision of the local representative of the Metal & Thermit Corp., having been recruited from the railway company's track welding gang. All of Saturday night was spent in preparing the fracture and assembling the welding equipment and materials. Preheating took until mid-afternoon Sunday, when the weld was poured. By midnight, the metal had cooled sufficiently to permit stripping off the molds, and by 3 a. m. Monday permanent repair of the shaft was completed, in ample time for the car lines to resume their regular Monday morning schedules.

In addition to the speed with which the shaft was restored to service, a feature was the alinement of the shaft after welding; being less than 1/32 in. out of line, the alinement was better, in fact, than it had been before.

The rapid resumption of demand in the automotive field was reflected during April in a new high point of unit production at the various plants of the Murray Corp., of America, Detroit, where bodies or body units are made for a number of the larger auto manufacturers, including the Ford Motor Co.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Outlook Improves Though Buying Drags

MACHINE tool demand is holding its own, although it has shown no further gain. Strikes and threatened strikes are factors in holding back buying, particularly in the Central West. The Mechanics Educational Society has called out operatives in job tool and die shops in Cleveland, and tire mold plants at Akron are tied up with strikes.

The outstanding order of the week was a purchase of six miscellaneous machines by the Galion Iron Works & Mfg. Co., Galion, Ohio. Production among machine tool builders at Cincinnati ranges from 20 to 25 per cent of normal. Current orders are well diversified, with some of them origi-

nating in Japan and Europe. Devaluation of the dollar has improved the position of American machine tools in Great Britain, where sales so far this year have shown substantial gains over 1933 and 1932.

The retooling program for next year's Buick models is expected to result in substantial machinery purchases within 60 days. Purchases by Pontiac, Chrysler and Packard are also in the offing. Changes for 1935 cars, it is said, will be so sweeping that the capital outlay for machine tools will probably be the largest in several years. Mounting labor costs have brought special purpose, automatic equipment back into favor.

est, to manufacture boilers of special design and allied equipment.

Supply Officer. Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until May 1 for ring gages, ring bands, gage assemblies, piston ring gages, etc. (Req. 5105 S. & A.); until May 3, wrenches, files, pliers, reamers, screwdrivers, etc. (Req. 934 Aero).

Knabb Barrel Co., Inc., Marcus Hook, Pa., recently organized to manufacture wire-bound barrels, kegs, etc., will take over and expand A. Knabb & Co., Inc., same place, manufacturer of kindred products. New company is arranging for sale of stock totaling \$1,143,200, considerable part of proceeds to be used for purpose noted, and purchase of raw materials, etc. Albert H. Knabb is president, and William H. Heins, vice-president and treasurer.

Neuwiler Brewing Co., Front Street, Allentown, Pa., will take bids early in May for addition, about 25,000 sq. ft. floor space, for bottling works. Cost about \$50,000 with machinery. Clarence E. Wunder, Architects' Building, Philadelphia, is architect.

Mitchell Specialty Co., Holmesburg, Philadelphia, has recently installed modern rolling machines and is now engaged in manufacture of general line of metal moldings and shapes, in straight length or bent form and in variety of cross sections. A. R. Evans, formerly with Edward G. Budd Mfg. Co., Philadelphia, is in charge of sales.

◀ WESTERN PENNA. ▶

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has let general contract to George Kircher & Sons, 1384 Clifford Avenue, Rochester, N. Y., for one-story and basement factory branch, storage and distributing plant, 105 x 150 ft., at Rochester, N. Y. Cost about \$40,000 with equipment. Walter H. Cassebeer, 84 Exchange Street, Rochester, is architect.

American Shear Knife Co., Third Avenue and Ann Street, Homestead, Pittsburgh, recently organized, has taken over property, located noted, for production of steel shear knives and other allied heavy steel products. H. Stanley Rogers is president, and B. B. Weinberg, vice-president and treasurer, both formerly connected with Heppenstall Co., Pittsburgh.

Kelly Creek Colliery, Ward, W. Va., plans new coal conveyor over Kanawha River, in connection with tippie at Cedar Grove. Cost about \$20,000.

Carroll-Gatesman Coal Co., Lucinda, Pa., plans rebuilding part of coal tippie and auxiliary mine structures recently destroyed by fire. New equipment will be installed. Cost about \$35,000.

◀ OHIO AND INDIANA ▶

City Council, Lakewood, Ohio, will take bids soon on general contract for one-story municipal machine shop, service and garage building at 12920 Berea Road. Cost about \$40,000 with equipment. B. R. Kimberley, City Hall, is architect.

Penn Service Oil Co., Canton, Ohio, plans rebuilding part of bulk oil storage and distributing plant recently destroyed by fire. Loss about \$40,000 with equipment.

Beacon Microphone Co., Akron, Ohio, has been organized by Vearne C. Babcock and Harry F. Clarke, 290 South Main Street, to manufacture microphones and kindred equipment.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until

◀ NEW ENGLAND ▶

Raytheon Mfg. Co., 55 Chapel Street, Boston, affiliated with Raytheon Production Corp., same address, manufacturer of radio tubes and equipment, etc., with plant at Newton, Mass., has arranged for purchase of former plant of Charles M. Howell & Son, Waltham, Mass. Newton works will be removed to new location and capacity increased.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 4 for one motor-driven drilling machine (Schedule 2278) for Newport, R. I., Navy Yard.

Oslund Brothers Machine Co., Inc., Holden, Mass., has been organized by Charles H. and Walter W. Oslund, and Leonard W. Howell, South Main Street, to manufacture machinery and parts.

Old Medford Rum Distillery, Inc., 83 Newbury Street, Boston, has plans for extensions and improvements in plant at Medford, Mass., including new storage and distribution facilities and other equipment. Cost over \$50,000 with machinery.

Merrimac Chemical Co., Inc., Chemical Lane, Everett, Mass., manufacturer of heavy chemicals, etc., has plans for one-story addition, 62 x 140 ft., for storage and distribution. Cost about \$30,000 with equipment.

◀ NORTH ATLANTIC ▶

Standard Oil Co. of New York, 26 Broadway, New York, plans new bulk oil storage and distribution plant at Kreischerville, S. I., including 35 steel tanks, pumping equipment, pipe lines, etc. Cost about \$700,000. C. A. Ellis is chief engineer.

Marino Spring Co., Inc., New York, has been organized by John Orman, 341 Fifty-sixth Street, and James J. Vardy, 326 Forty-ninth Street, both Brooklyn, to manufacture coil springs and kindred equipment.

Steinhardt Co., Inc., New York, recently reorganized, has leased eight-story and basement building at 644 Greenwich Street for new whiskey and liquor plant, with equipment for blending, rectifying, bottling, etc.

Kastar Specialty Mfg. Co., 141 West Seventeenth Street, New York, manufacturer of automobile equipment and supplies, has leased 10,000 sq. ft. floor space in building at 510 Sixth Avenue for new plant.

Central Casting, Inc., Brooklyn, has been organized by Leo and Joseph Zellinger, 102 South Third Street, Allentown, Pa., to manufacture brass, bronze and kindred metal castings.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until May 3 for 41 steel buoy bodies, from 9 ft. diameter by 38 ft. long, to 5 ft. diameter by 15 ft. long, with skeleton lantern towers and bottom counterweights.

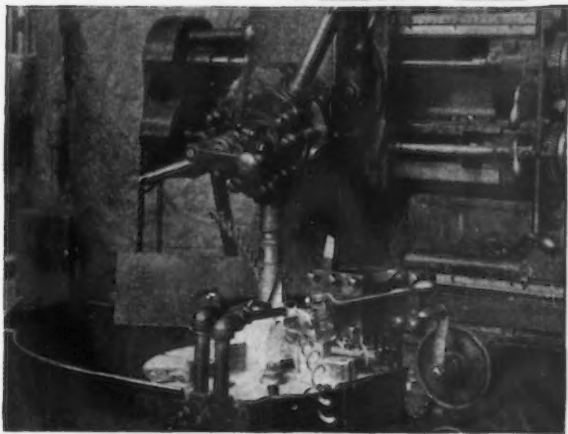
Signal Supply Officer, Army Base, Brooklyn, asks bids until May 1 for one combination sander, one surfacing machine and one welding equipment (Circular 90); until May 4, 30,000 ft. steel tape armored subterranean cable (Circular 93), 44 ammeters and 10 voltmeters (Circular 92); until May 7, two gasoline engine-driven power units with generator (Circular 91).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 1 for 750 water gage glass fittings (Schedule 2270); electrically heated and operated sanders (Schedule 2286-R) for Brooklyn Navy Yard.

Mid-Jersey Machine & Welding Co., Elizabeth, N. J., has been organized by William S. Powers and Donald G. Davis, 272 North Broad Street, and associates, to manufacture automobile parts, and operate a general machine and welding works.

Waterfilm Boilers, Inc., Jersey City, N. J., has been organized by officials of L. O. Koven & Brother, 154 Ogden Avenue, manufacturers of boilers, tanks and kindred plate products, with capital of \$100,000, as an affiliated inter-

DRILL MORE HOLES PER GRIND



MACHINE: Bullard Vertical Turret Lathe.

MATERIAL: 3135 Steel.

DRILL: 2 1/4 in., 70 R.P.M.

LUBRICANT: 1 part Sunoco to 20 parts water.

*Courtesy of The Bullard Co.
Bridgeport, Conn.*



*with
Sunoco!*

THE drilling of metals is so often regarded as such a simple operation that it may be overlooked as an important factor in costs.

Actual performance records of Sunoco Emulsifying Cutting Oil prove that it definitely helps give greater production, greater accuracy and lower production costs in the drilling operations.

Drills Cut Faster

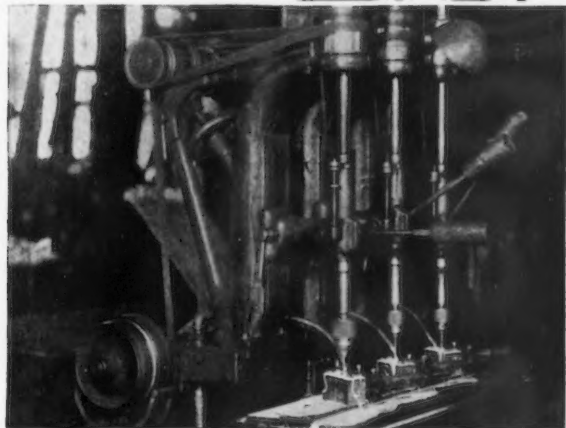
When Sunoco is the cutting oil utilized, you will find drills cut faster and produce more holes per grind.

The lubricating and cooling properties of this cutting oil aid drills in cutting true cylindrical holes of accurate size. Reaming and spoilage are reduced or eliminated.

No Clogging or Burning

Long drill life and low power costs go hand in hand with the use of Sunoco because drills clear easily, and do not clog, bind, chatter or burn.

You will find, by test, that Sunoco clearly qualifies for your drilling operations! Write now for details on Sunoco . . . and remember that the services of our experienced cutting oil engineers are at your disposal.



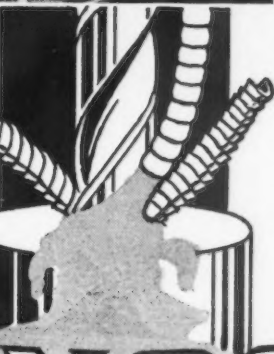
MACHINE: Leland - Gifford High Speed Drill Press.

MATERIAL: Bolt Steel.

DRILL: No. 3; 644 R.P.M.

LUBRICANT: 1 part Sunoco to 15 parts water.

*Courtesy of
Canadian Line Materials, Ltd.
Scarborough Junction, Ont.
Canada*



SUNOCO

EMULSIFYING
CUTTING OIL

**SUN OIL COMPANY
PHILADELPHIA**

Offices and Warehouses in More Than 100 Cities

*Subsidiary Companies: Sun Oil Co., Ltd., Montreal
British Sun Oil Co., Ltd., London, Eng.*

May 5 for 100 engine-driven vacuum pump assemblies and 100 suction relief valve assemblies (Circular 451).

Great Northern Distilleries, Inc., Fostoria, Ohio, care of C. H. Stone, Fostoria, general manager, organized a few months ago with capital of \$1,000,000, will soon begin erection of one and three-story plant on Sandusky Street, where site has been secured, including power house, machine shop and other mechanical units. Cost about \$350,000 with equipment. H. W. Hannah, 118 Massachusetts Avenue, Detroit, is architect.

Hanna Coal Co., Leader Building, Cleveland, has let general contract to Link-Belt Co., 910 South Michigan Avenue, Chicago, for new four-track coal tippie at Piney Fork mining properties, near St. Clairsville, Ohio, to include mechanical washing and other facilities. Cost over \$100,000 with equipment.

Merchants Distilling Co., Terre Haute, Ind., plans extensions and improvements, including new steel fermenting tanks and other equipment, bottling machinery, etc. Cost about \$45,000. Walter C. Wagner, Breslin Building, Louisville, is architect.

Commercial Heat Treating Corp., recently incorporated by D. Richardson, T. A. Waltz and S. C. Nielson, has leased space at 3120 Forrer Street, Oakley, Cincinnati, and is in operation.

◀ BUFFALO DISTRICT ▶

Kimberly-Clark Corp., Packard Road, Niagara Falls, N. Y., manufacturer of paper products, with main mill at Neenah, Wis., has let general contract to Wright & Kremers, Inc., Niagara Falls, for five-story addition, 83 x 200 ft., for storage and distribution. Cost over \$75,000 with equipment.

Genesee Brewing Co., 100 National Street, Buffalo, has let general contract to M. A. Clark, 73 Westland Avenue, for one-story addition, 50 x 170 ft., and improvements in present plant. Cost over \$65,000 with equipment.

Way Sagless Spring Co., Abell Street, Toronto, Ont., manufacturer of bed springs, etc., plans rebuilding part of multi-story plant recently destroyed by fire. Loss over \$100,000 with equipment. Headquarters are at 201 S. E. Main Street, Minneapolis, Minn.

◀ SOUTH ATLANTIC ▶

Town Council, Honea Path, S. C., plans purchase of 75,000-gal. steel tank on 90 ft. tower, pumping machinery and auxiliary equipment for municipal water system. J. E. Sirrine & Co., Greenville, S. C., are consulting engineers.

Supply Officer, Navy Yard, Charleston, S. C., has secured appropriation of \$25,000 for improvements and replacements in present machine tools and purchase of new tools.

Greenville Textile Machinery Co., Greenville, S. C., manufacturer of textile machinery and parts, plans extensions and improvements. Cost about \$18,000 with equipment.

Public Works Commissioners, Fayetteville, N. C., asks bids until April 30 for 300 water meter boxes. William C. Olsen, Raleigh, N. C., is consulting engineer.

◀ SOUTHWEST ▶

United States Engineer Office, Missouri River Division, Postal Telegraph Building, Kansas City, Mo., asks bids until May 7 for eight gasoline-electric generating sets (Circular 92) for dredges, Fort Peck Dam, Mont.

International Oil Burner Co., Inc., St. Louis, has been organized by Solomon Wolff and Sidney J. Heiman, 3971 Utah Place, and associates, to manufacture oil burners and oil-burning equipment.

City Council, Cotton Plant, Ark., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for municipal water system. Fund of \$60,000 has been secured through Federal aid.

Common Council, La Plata, Mo., is arranging fund of \$100,000 for new municipal electric light and power plant, using Diesel engine-generating units, and distribution system. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

City Council, Humble, Tex., asks bids until May 8 for equipment for municipal water system, including elevated steel tank and tower, pumping machinery, fire hydrants, pipe lines, etc. Fund of \$80,000 has been arranged. Garrett Engineering Co., Houston, Tex., is consulting engineer.

Ordnance Office, Eighth Corps Area, Fort Sam Houston, Tex., asks bids until April 30 for one pedestal grinder and one universal tool grinder (Circular 24), machinist's precision type bench lathe (Circular 25), electric drill (Circular 26), welding and cutting equipment (Circular 28), centering machine (Circular 30), jointer (Circular 32), and rotary converter motor-generator set (Circular 31); until May 6, 12 racks steel shelving and extra parts (Circular 2), tractor crane (Circular 31).

◀ MICHIGAN DISTRICT ▶

Lansing Brewing Co., Lansing, Mich., has asked bids on general contract for new multi-story plant. Cost about \$100,000 with equipment. Mildner & Eisen, Hammond Building, Detroit, are architects.

Buhr Machine & Tool Co., Ann Arbor, Mich., plans one-story addition. Cost about \$25,000 with equipment. Fry & Kasurin, Ann Arbor, are architects.

Schmidt Brewing Co., 1995 Wilkins Street, Detroit, has let general contract to Kriehoff Co., 6661 French Road, for new two-story power house at brewery. Cost about \$50,000 with equipment.

Upton Machine Co., St. Joseph, Mich., manufacturer of washing machines and parts, with headquarters at Binghamton, N. Y., has plans for one-story addition, 90 x 200 ft., for storage and distribution. Cost about \$40,000 with equipment.

City Machine & Tool Works, Dayton, Ohio, manufacturer of special machinery and parts, dies, etc., has taken over Paulins Tool & Engineering Co., Detroit, manufacturer of locks, jigs and allied equipment, and will continue production of standard locks and other specialties under trade name of Cimatool-Paulins.

◀ SOUTH CENTRAL ▶

Republic Distillers, Inc., Cincinnati, care of Carl J. Kiefer, Schmidt Building, consulting engineer, recently organized to take over group of distilling, blending and rectifying plants in Kentucky, has plans for new distillery and other units at plant of Dowling Brothers Distilling Co., Burgin, Ky.; Waterfill & Frazier, Inc., and Ripy Brothers, both Lawrenceburg, Ky., and H. A. Thierman Co., Inc., Louisville. Cost over \$500,000 with equipment. Company will also take over former Friedberg & Workum Distillery, Lynchburg, Ohio, where similar expansion will be carried out. Cost about \$100,000 with machinery.

Director of Purchases, Tennessee Valley Authority, New Sprinkle Building, Knoxville, Tenn., asks bids until May 2 for monorail conveyor (postponed from April 20); until May 9, pneumatic conveyor equipment and two steel storage silos for fertilizer works, nitrate plant No. 2; 19 fabricated steel transmission towers for Wilson Dam-Norris Dam transmission line.

Milliken & Farwell, Maritime Building, New Orleans, have plans for rebuilding cane sugar mill near Luling, recently damaged by fire. Cost over \$45,000 with equipment.

City Council, Magnolia, Miss., plans installation of Diesel engine unit and accessories, pumping and other machinery for improvements in municipal water system. Henry A. Mentz & Co., Inc., Hammond, La., is consulting engineer.

◀ MIDDLE WEST ▶

Sinko Tool & Mfg. Co., 351 North Crawford Avenue, Chicago, manufacturer of tool specialties, cigar lighters, sheet metal stampings, etc., has plans for one-story top addition, 95 x 125 ft. Cost over \$40,000 with equipment.

City Council, Wellman, Iowa, has rejected bids recently received for equipment for new municipal electric light and power plant and distribution system. New bids will be asked later on revised plans. Fund of \$85,000 has been arranged. H. L. Cory, Redick Tower Building, Omaha, Neb., is consulting engineer.

Mary Ann Gold Mines, Inc., Manitou, Colo., care of A. deMarconny, Manitou, president, recently organized to operate local gold-mining properties, has arranged for a stock issue of \$87,500, considerable part of fund to be used for plant and equipment.

City Council, St. Cloud, Minn., has plans for new municipal electric light and power plant. Cost \$1,249,000. Federal financing is being arranged. Burns & McDonnell Engi-

neering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Common Council, Grand Island, Neb., asks bids until May 2 for deep-well turbine pumping machinery and accessories for municipal waterworks.

◀ WASHINGTON DISTRICT ▶

General Purchasing Officer, Panama Canal, Washington, asks bids until May 1 for copper cable, stove wire, insulated cord, etc., one gasoline engine, two bronze propellers, one oil testing set, drop forge links, rigid steel conduit, galvanized steel tongues, reamers, pipe dies, ratchet braces, shovels, scythe blades, hacksaw blades, etc. (Schedule 2955); until May 3, three centrifugal type horizontal pumps, two priming pumps, one motor-driven bilge pump, one motor-driven air compressor, three transformers and one electric switchboard (Schedule 2954).

Baltimore Pure Rye Distilling Co., Sollers Point, Baltimore, has plans for one-story addition for storage and distribution, and for improvements in present storage and distributing division. Cost over \$30,000 with equipment. Benjamin Frank, 517 North Charles Street, is architect.

Secretary, Department of Interior, Washington, asks bids until May 1 on general contract for new steam-operated electric power plant, 92 x 115 ft., at Howard University.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 1 for one crawler or track-type tractor (Schedule 2280-R), industrial wheel-type tractor and tractor mower (Schedule 2282-R), gasoline engine-driven self-propelled crane, with swinging boom (Schedule 2259) for Washington Navy Yard.

◀ PACIFIC COAST ▶

Hormovita Corp., 543 South Sutter Street, Stockton, Cal., Victor Leonardini, head, recently organized, plans new distillery on Roberts Island Road, fronting on San Joaquin River, to include power house, pumping station and machine shop. Cost about \$250,000 with equipment.

Resilient Hammer, Inc., Seattle, care of Chambers & Masuda, 503 Smith Tower Building, has been organized by Robert P. Martin and Eber W. Badcon, to manufacture mechanical hammers and kindred heavy equipment, instruments, parts, etc.

Bear Creek Vineyard Association, Lodi, Cal., L. K. Marshall and Gottfried Handel, Lodi, heads, recently organized, plans new winery at Haight Station, near Lodi, with power house. Cost about \$60,000 with equipment.

Balboa Brewing Co., San Diego, has let general contract to Walter Trepte, 211 Scripps Building, for remodeling a three-story and basement building, 45,000 sq. ft. floor space, at North Main Street and Antonia Avenue, Los Angeles, for new plant. Brewing, bottling and other equipment will soon be purchased. Cost about \$85,000 with machinery. Wayne D. McAllister, Biltmore Hotel, Los Angeles, is architect.

Perfection Water Heater Co., Inc., Glendale, Cal., care of Chauncey G. Kolts, 609 California State Building, Los Angeles, representative, has been organized by J. B. McKinley and George W. Kite, Jr., both of Glendale, to manufacture water heaters and parts.

◀ FOREIGN ▶

Ministry of Industry, Government of Turkey, Istanbul, has authorized plans for remodeling former Government building about a mile from city on Bosphorus Strait, for new pulp and paper mill. Cost over \$300,000 with machinery.

City Clerk, Brisbane, Australia, asks bids until June 8 for converters, switchgear, transformers and accessories, control apparatus and other electrical equipment for substation.

Commissariat of Education, Soviet Russian Government, Moscow, plans 13 new radio broadcasting and receiving stations in southwestern and far eastern parts of country, with steel towers, generating stations and other units for long-distance service. Cost over \$500,000 with equipment. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Arrechabalas Refinery, Ltd., Cardenas, Cuba, has authorized expansion and improvement program, including new centrifugal machines and auxiliary equipment.

How BRISTOL'S Control licked a tough problem that threatened to endanger quality production

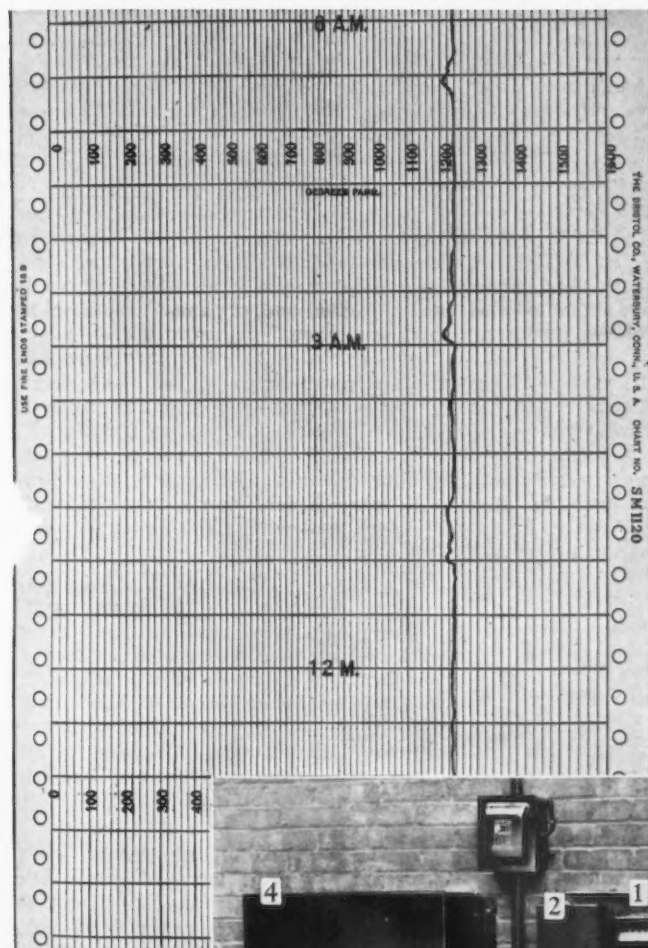


Chart shows record of hot blast temperatures as result of BRISTOL'S Automatic Control.

SEVERAL years ago blast furnace plants first began to realize that, because of the difficulties involved, little or no attention was being given to the control of the hot blast temperatures. As a result, uniform quality could not be assured.

The problem was submitted to BRISTOL'S Engineers, who, after painstaking study and analysis in the field, developed and perfected BRISTOL'S Automatic Hot Blast Temperature Control.* In actual use, now, for many years, this automatic control system numbers many successful installations. It provides precision regulation of temperatures for different burdens, prevents loss during stove changes at peaks, insures efficient melting, cuts down dust, saves stove tender's time, increases quantity per cast at lower cost, and controls quality of iron.

These economies are of interest, since they show what can be expected when BRISTOL'S Automatic Control is prescribed under comparable conditions in any plant. If you have a knotty production control problem that so far has defied disentangling, put it up to BRISTOL'S Engineers. They will welcome the opportunity to cooperate with you.

* If interested in a pamphlet descriptive of this automatic control or blast furnaces, write for BRISTOL'S Bulletin 372.



Complete installation of BRISTOL'S Hot Blast Temperature Control includes (1) Pyrometer Controller, Model 479A, with (2) Auxiliary Contacts, (3) Manual-Electric Control Station, (4) Relay Panel, (5) Valve Operating Mechanism, and (6) Recording Pyrometer, Model 425.

THE BRISTOL COMPANY ~ WATERBURY ~ CONNECTICUT

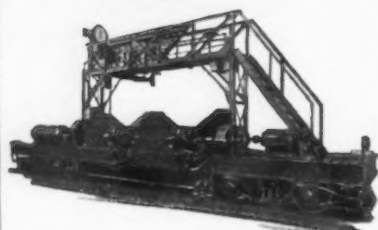
Branch Offices: Akron, Birmingham, Boston, Chicago, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco

TRADE MARK
BRISTOL'S

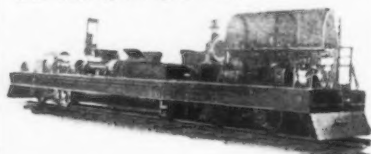
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PIONEERS IN PROCESS CONTROL SINCE 1889

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20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

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Gas Electric and Diesel-Electric Locomotives
Electric Transfer Cars for Blast Furnaces and Steel Plants
Stockhouse Scale Cars for Blast Furnaces
Concentrate and Calcine Cars for Copper Refineries
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Coal Charging Lorries, Coke Guides and Clay Carriers
Atlas Patented Coke Quenching Cars for By-Product Coke Ovens
Atlas Patented Indicating and Recording Scales
Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.
Engineers - Manufacturers
1140 Ivanhoe Rd., Cleveland, O.

Hardness Variations as Controlled By Temper Colors

(Concluded from Page 25)

and temperature with a fair degree of accuracy.

Although the above fact is true in practical hardening, it is not advisable to draw the temper of a tool too quickly for several reasons. The first and most important is that uniformity of heat distribution is almost impossible with a fast draw on a plate or in a furnace unless a tool has a very uniform section. Furthermore, steel changes in volume when drawn is so that quick heating results in severe internal strains which may even rupture the tool if the heat is very badly distributed. Another reason for slow drawing is that colors change rapidly at the high temperatures, and it is difficult to stop the draw exactly at the desired point.

In the investigation it developed that temper colors were affected by the composition of the steel, the surface conditions and the rate of circulation of the air in contact with the surface being colored. Surfaces must be properly prepared to produce even coloring. Fairly smooth grinding is satisfactory, although polished surfaces color most evenly. Rough grinding often produces spotty and uneven coloring.

Chromium Retards Colors

It was found that chromium has a decided retarding influence on the appearance of the temper colors; therefore, steels containing a high percentage of chromium cannot be accurately drawn by the color method. This provision applies to such steels as high carbon, high chromium steel, stainless steel, high speed steel, etc. However, steels containing only a small percentage of chromium, such as the high manganese type of oil hardening non-changeable steel, can be tempered to color with a fair control of hardness. Other steels containing chromium in small percentages that can be drawn to color are chrome vanadium steel, fast finishing steel, ball bearing steel, and a great number of high alloy steels.

In a study of temper colors in Table I and Table II, it is readily seen that they change gradually from a light straw to a dark straw color, then abruptly through the purple range to the blue shades, and then gradually again over the gun metal or gray range.

Hence the temper colors control hardness with greatest accuracy over the purple to blue scale when an increase of only 10 deg. in temperature produces a decided change in color. Often tool makers notice quite a variation in color on a piece of steel

over this range and are under the impression that the tool varies in hardness in different parts, but a test usually reveals practically no hardness variation. The fact is that some small variation in temperature, surface condition or air circulation caused this apparently great variation in color.

Another point of importance is that the purples appear somewhat differently in artificial light than in sunlight. They have a more reddish appearance. The straw colors, blues, and grays are affected very little by a change of illumination.

As an aid to check temperatures and to enable the small shops to quickly determine a particular temperature range, the author has developed a series of alloys melting at various temperatures. These alloys are accurate to plus or minus five Fahrenheit degrees, and have been produced in 25 deg. steps throughout the range of 300 deg. to 600 deg. F. By placing suitable pieces of these alloys over a tool surface, any particular drawing temperature may be determined within the limits of small shop requirements.

Table No. II shows the temperatures which produce the various temper colors when carbon steel or a light alloy steel is held for exactly 5 min. at the maximum temperature. It should be noted that a dark blue appears before a light blue, although many tables reverse this order. This table also gives the Rockwell hardness which may be expected for the colors shown by the four different steels.

Although bath tempering when properly done is more accurate than drawing by color, it may be said that temper colors still have their field, and when understood and used intelligently they will reproduce hardness values quite accurately. The main requisite in tempering by color is to be able to heat uniformly enough to produce a uniform color, the one exception being the purple range where a variation in color is permissible.

The Pennsylvania Railroad has placed orders with the General Steel Castings Co., Eddystone, Pa., for cast steel beds or underframes for 14 B-1 electric switching locomotives. The beds for the engines, each weighing 24,000 lb., will be made at the Eddystone plant of the corporation. Electrical propulsion and control apparatus for the locomotives is being manufactured by the Allis-Chalmers Mfg. Co., Milwaukee. The engines will be assembled at the railroad's Altoona, Pa., works.



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"Above the Hook" problems are solved by the correct combination of Osborn Tramrail units.

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BETTER METHODS AWAIT INVESTIGATION

Your materials handling methods may seem adequate. But ARE they? Advancement in design, incorporated in Osborn Tramrail Systems and Osborn Grab Equipment, opens wide opportunity for greater economies. Sheet Grabs . . . Roll Grabs . . . Barrel Grabs . . . in fact, Grabs of all kinds . . . are available to meet any load problem. Before you invest in materials handling equipment . . . INVESTIGATE Osborn Tramrail Systems.

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OSBORN

TRAMRAIL SYSTEMS

How Attractive Finish Helps Metal Products Sales

(Concluded from Page 21)

pound on a flexible wheel enables the operator to cut burrs and give a final finish in one buffing operation. Sometimes beeswax is used on the wheel as an aid to cutting and to give a somewhat higher finish.

Greaseless final coloring and buffing also has been developed by the Lea Mfg. Co. The usual compounds set up with grease melt at a point sufficiently low to allow the composition to transfer from the bar to the wheel by the aid of the heat caused by the friction of the revolving wheel, and by this same process some of the grease is transferred to the work, due to the heat of the friction between the wheel and the work. The grease on the work, especially in ornamentations or contours, is difficult to remove and the parts

slate color and at the same time produce an abrasion resisting surface.

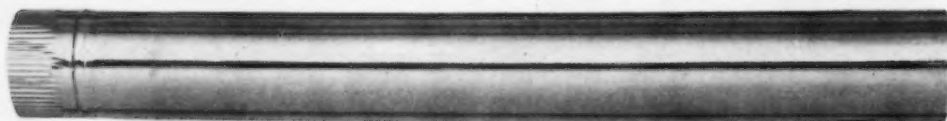
Another type of dull gray surface is produced on aluminum by the use of rotary wire brushes which are frequently made from German silver, stainless steel, or nickel wire. One common type of aluminum brushing wheel is 6 in. in diameter, operated at 600 r.p.m., made up of nickel wire 0.01 in. in diameter. Satin finish on aluminum may be obtained by using fused alumina grits on canvas belts traveling at about 3000 ft. per min. A large manufacturer of small aluminum products intended for five-and-ten-cent store distribution uses a composition of tallow and stearic acid to prevent the polishing wheels from becoming loaded with aluminum particles picked up from the article.

reflector and reduce the heating efficiency. A dull finish absorbs heat more readily. A highly polished surface on the other hand will radiate heat less effectively than a dull surface and so there is a utility value as well as an appearance value in having the sides of a skillet highly polished.

Hand and Machine Operations

The interior of cooking utensils is finished on a quantity production basis by using a horizontally revolving chuck which holds the dish at a convenient height with the open interior upward. The polisher then takes a pad made up of rectangular pieces of cloth sewed together much after the style of the buff and coated with fused aluminum oxide and oil. This pad he holds against the side of the revolving dish and in a short time creates the desired finish. Sometimes steel wool pads are used in a similar way.

Where polishing machines are used for cooking utensils the work usually revolves at about 100 r.p.m. and the



EVEN the humble stove pipe section takes on an attractive appearance when plated and polished.

Courtesy, Apollo Steel Co.

frequently must be soaked or scrubbed. The greaseless compounds leave the work clean or else covered with a slight loose deposit which is easily removed.

Polishing Aluminum

The recent increase in the number of applications of aluminum as, for instance, for railway equipment, roofs, furniture, airplanes, tank cars, and fencing, calls the attention of the polisher to the technique of finishing this metal. In general aluminum requires special treatment in polishing. As with other soft metals, many polishers use greased wheels to avoid tearing the surface. A dry wheel tends to load when used on aluminum. To avoid this, kerosene is occasionally used as a lubricant and some experienced polishers say that it is just as good as any of the prepared products for this purpose. Other polishers successfully use ordinary tallow as a lubricant.

In some special cases, such as ice cube trays in refrigerators, an electric finish known as the anodic finish is used to give the familiar gray

When wheels do become loaded, they cause scratches on the work. Automatic machines frequently use belts instead of wheels, in which case the same lubricants are used in a thinner mixture.

Aluminum Cooking Utensils

A practical example of polishing cast aluminum is the familiar heavy skillet. One company first polishes this article around the edges by hand with a sewed buff coated with a No. 120 grit compound. The outside surface is then polished on a semi-automatic machine using compounds first with No. 90 and then No. 120 grit on bull neck leather wheels, following this with No. 240 grit on sheepskin leather.

Final buffing consists first of tripoli grease on cloth buffs and then a lime coloring composition on paper wheels. These paper wheels are made up in a manner similar to the cloth buff except that disks of heavy brown paper are used in place of the cloth.

The bottom of the skillet is purposely left with a rough finish. If it were polished it would act as a

spindle oscillates at six or seven strokes a minute. Aluminum castings when discolored are sometimes heated to around 500 or 600 deg. F. for a half hour or so to remove the discoloration. Blasting aluminum castings with fused alumina abrasive is a common finishing operation. One company uses No. 80 grit applied with an air pressure of 40 lb. to secure a matte finish.

TRADE NOTES

Providence Engineering Works, Inc., Providence, R. I., has appointed R. Lewis Giebel, 236 West Fifty-fifth Street, New York, as exclusive representative in New York territory for line of sensitive ball bearing drill presses.

Marr-Galbreath Machinery Co., now located at 58 Water Street, Pittsburgh, will move to 55 Water Street about May 1. Electric traveling cranes have been installed and much better display of machinery will be carried.

Amthor Testing Instrument Co., manufacturers of speed recorders and testing instruments for paper, cordage and light metals, has moved from 309 Johnson Street, to 4-10 Leo Place, Brooklyn. New plant combines office, showroom and factory on one entire floor.

The NEWPORT ROLLING MILL CO.

Since 1891 producers of

HIGH GRADE

IRON

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**STEEL
SHEETS**

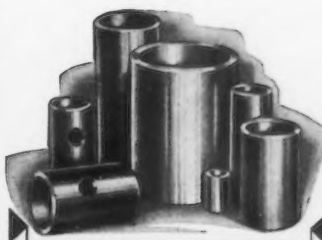
FOR EVERY PURPOSE

Globe Brand Galvanized Sheets fabricate easily and are unsurpassed in uniformity of metal structure, gauge, and working qualities.



Hot and Cold Rolled Sheets, Newport Electrical Sheets, GOHI Pure Iron-Copper Alloy, Globe Brand Galvanized Sheets, GOHI Enameling Sheets, Kentucky Copper Bearing Steel, Newport Long Terne Sheets.

THE NEWPORT ROLLING MILL CO., NEWPORT, KY.



**STOCK BUSHINGS
AND BEARINGS**

IN many instances you can select from this stock the very bearing or bushing you want, completely machined and finished, ready for assembly.

Write for list.

OVER 500 different stock sizes of Bunting Ready Made Bushings and Bearings covering all usual applications.



**MACHINED AND CENTERED
BRONZE BARS**

WHEN the job requires bar bronze call for the bar that saves excessive labor, reduces waste, and delivers a finished bearing or part of really high quality at the minimum of cost. Write for list.

116 STOCK sizes, perfectly alloyed, accurately cast, machined and centered. Available from leading mill supply dealers.



LEAD BASE BABBITT

IF it's Lead Base Babbitt you want here is the bar that made history in Babbitt metallurgy. Ask any leading mill supply wholesaler.

CAST into 5-pound bars in such a form as to be easily divisible into smaller portions.

The Bunting Brass & Bronze Company

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QUALITY
BUSHINGS • BEARINGS • BARS • PARTS
SUPERIOR LEAD BASE BABBITT

JUST BETWEEN US TWO

Safer But Less Sporting

GEORGE GRAVES wins the story-telling championship of England with this:

"An insane asylum attendant told a rich patron that the asylum's new swimming pool was becoming so popular with patients, particularly those who could dive, that the superintendent intended having it filled with water."

Jokers

OUR work of maintaining the circulation of this family journal requires us to send out large quantities of business reply envelopes, on which we pay postage. Hardly a week goes by that one of these envelopes is not returned with an anonymous and unsolicited contribution.

Recent offerings include a receipt for a pound of Kenny's Jig Saw coffee, an acknowledgment of an expression of condolence on the decease of a gentleman we didn't even know was sick, a subscription order from Betty Van Dusen of LaPorte, Ind., who is probably in the fourth grade, several condensed milk labels, and a note from "Anti-NRA" whose father was something of a looker-ahead. The note reads:

"Fifty years ago my father said to me that the day would come when Labor will demand (sic) only one hour per week and that hour consumed in collecting their pay. The NRA now appears to be a realization of his forethought."

So far we haven't heard of anyone finding the success or failure of the NRA forecast in the Bible, but it won't be long now.

"Can't You Come in Again Some Time?"

IT must be annoying to Harry Abels, who runs a combination machine shop and men's furnishing store in Healdton, Okla., to get a call for a pair of white flannels right when he is in the middle of a particularly greasy lathe job.

Longevity Record

THE all-time advertising longevity record was established by our Lake George subscriber who sent in a clipping of an ad that appeared in an 1875 issue of The Iron Age and asked us to obtain for him a part for the kitchen pump advertised.

But just recently we received additional evidence of the fact that you can never be certain when an ad is officially dead. A Pennsylvania machinery builder sends in a clipping of a blind ad in the "Business Opportunities" Section run in October, 1930, by a manufacturer with a yearning for consolidation. The Pennsylvania man wants to know, three and a half years later, whether the opportunity is still open.

Iron Age ads pull for y'ars and y'ars.

Efficiency Boosters

FOREMAN LEITIN, 23, had charge of the foundry department of a Soviet tractor plant. Waste in his department displeased the management. A mock funeral was arranged. Alongside a black coffin was placed a photograph of Leitin, with a sign, "Death to waste!" Accompanied by a band playing a dirge, the coffin was carried through the factory.

Disgraced, Leitin slashed his throat and wrists. The three factory officials responsible for the fatal waste campaign have been jailed.

Unloveliest of Words

TO our mind one of the unloveliest of adjectives is "un-American." We never see it without detecting or imagining a faint odor of hypocrisy and intolerance on the part of the user. We saw "un-English" in an English newspaper the other day.

When we save up enough money to buy that short-wave receiver we shall probably find that in these days of rampant nationalism the air is full of "un-Siamese," "un-Finnish," "un-Manchukuoan," "un-Yugo-Slavian," not to mention "un-Free City of Danzigian." Ray for the uns!—A.H.D.

Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter 7" milling length. They cut costs, increase production, boost profits

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Chicago: John H. Glover, 2127 North Bayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 1077 Erie Cliff Drive, Lakewood, Ohio.
New England: Potter & Johnson Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y., also Rochester, N. Y.
Pennsylvania: Aren Machinery Co., 1085 Park Bldg., Pittsburgh, Pa.
Philadelphia: Lloyd & Arms, Inc., 133 South 36th St., Philadelphia, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif.

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One to Six Spindles

Tapping Attachments and Multiple Heads

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ABRASIVE SURFACE GRINDER

Either Horizontal or
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Type
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Armide (Carbide-tipped) Cutters

for use in ARMSTRONG
TOOL HOLDERS Come
Ready-Ground to stand-
ard cutter forms.

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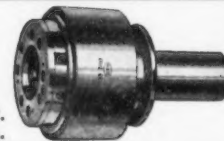
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